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ON THE CONVERSION OF MONOHYDRATED INTO COMMON
PHOSPHORIC ACID.

BY J. M. MAISCH.

Since the investigations of Graham into the nature of phosphoric acid, and his important discovery of the three hydrates, which form three corresponding series of salts, no further researches appear to have been instituted. The standard works on chemistry contain scarcely anything beyond an abstract of the statements made by Graham about thirty years ago, and thus it happens that we know very little yet about the transition of one hydrate into another one. Starting with the phosphate of lime in bones and the common phosphate of soda, the pyrophosphate of soda and metaphosphoric acid have undoubtedly been often the subjects of experiments. What is known, however, of the reconversion of meta- and pyrophosphoric acid into the ordinary tribasic acid, is contained in the following paragraph of Graham's Elements of Chemistry: When solutions of the metaphosphate and pyrophosphate of water are warmed, they pass gradually into the state of common phosphate, combining with an additional quantity of water; and the metaphosphate of water appears then to become at once common phosphate without passing through the intermediate state of hydration of the pyrophosphate. Otto says, that on boiling the solution of metaphosphoric acid, it is very rapidly converted into the common acid, without, it seems, previously forming the deuthydrate.

The glacial phosphoric acid consists chiefly of HO_2PO_4 , to obtain from it the ordinary acid, would appear to require merely to warm or boil its aqueous solution. On making the experiment, however, it will not be found so easy as supposed. The

committee having charge of the final revision of the *Pharmacopœia*, experienced this difficulty and handed the subject over to me for investigation.

It is well known that the monobasic acid produces gelatinous precipitates in the solutions of most metallic oxides, coagulates albumen, and after neutralization, yields with nitrate of silver a white precipitate; the deutohydrate resembles the former only by precipitating silver salts white after it has been previously neutralized; the terhydrate under the same circumstance, yields a yellow precipitate. For the following experiments, Merck's glacial phosphoric acid was employed, and care taken to select pieces perfectly transparent and free from earths and other acids.

If some of this glacial phosphoric acid is thrown into cold water, it is slowly dissolved, and the solution shows the above reactions of the monohydrated acid; set aside at our summer temperature for two or three weeks, the solution ceases to coagulate albumen, and yields now a purely yellow colored precipitate with salts of silver. The acid has been converted into the terhydrated, and apparently without becoming first the deutohydrate; for, in proportion to the decrease of the coagulation the yellow color of the precipitate becomes more apparent. The change is not brought about suddenly, but gradually; and similar is the behaviour of the deutohydrate; dissolved in water, it is gradually converted into the terhydrate. It is very probable that the bulk of the solution and its density, that is, the concentration of the solution, may have a marked influence on the time requisite for forming the terhydrate, as I shall show in another place, but my experiments were not extended so far.

When a strong solution of metaphosphoric acid in water is heated to the boiling point, and the boiling continued with the precaution to condense the evaporating water or most of it in the retort, so that the solution may at no time assume a syrupy consistence, it will be found that the bulk of the precipitate produced in a solution of albumen will gradually lessen, and after an hour or two, according to the amount operated with, will cease entirely; but now and at all times during the ebullition, the liquid, neutralized with soda or ammonia, produces a white precipitate with nitrate of silver, free from any tinge of

yellow. The solution, it appears, contains pyrophosphoric acid, and is not perceptibly changed on continuing to boil for several hours more.

The syrupy liquid contained in bottles filled with glacial phosphoric acid, after having absorbed some moisture, consists at first of the mono- and deutohydrate, dissolved in water; heated to boiling, it changes very slowly into the bibasic acid. As the conversion proceeded much slower than in the former instance, experiments were made with a very dilute solution.

This diluted solution, containing about a drachm of the glacial acid in 8 or 10 fluid ounces of water, was heated to boiling and kept at this temperature; in about twenty minutes it had lost the property of coagulating albumen; but previous to this, the precipitate with silver was perceptibly yellow, though not quite as deep colored as from the common phosphate of soda.

This precipitate had not become of a deeper yellow after the liquid ceased to coagulate albumen, and if the boiling was continued for several hours, little change could be perceived. It was evident that the solution contained some terhydrate and deutohydrate mixed. Experiments were now made with the same solutions, the strong, syrupy, and dilute, at temperatures between 110 and 200° F. In all instances the result was similar to that just described, with the exception that generally a longer time was required to alter the monohydrate, the lower the temperature was to which the solution was exposed. Now, too, the strong solutions afforded no evidence of the presence of the terhydrate after the monohydrate had disappeared, while the weak solution, on the contrary, contained terhydrate, as was shown by the color of its silver precipitate.

If phosphorus is oxidized by nitric acid, the solution contains common phosphoric acid, which, after evaporation, may by heat be converted into the deuto- and monohydrate. If the monohydrate is now dissolved in diluted nitric acid and heated, it will lose its property of coagulating albumen, and will produce a yellow precipitate with silver salts, identical in color with that obtained from the common phosphate of soda. This change in the presence of nitric acid does not appear to be unaffected by the density of the solution; but, as before, a more dilute solution is more readily converted into the tribasic acid than a concen-

trated one, and apparently without the previous production of the bibasic acid.

At first, I supposed that the metaphosphoric acid contained some compound requiring oxidation, before the change could be effected, but a careful trial showed the absence of any nitrous acid vapors by the time the conversion was complete. It is likewise not the presence of another mineral acid which effects the change of the mono-into the terhydrate; for when boiled with hydrochloric acid, the solutions scarcely yield more of the terhydrate than is obtained by the aqueous solution alone, while pyrophosphoric acid remains mixed with it, and an addition of common phosphoric acid does not exert any influence on the solution provided it be perfectly free from nitric acid.

That the cause cannot be looked for in the higher temperature, necessarily produced by the addition of nitric acid, is evidenced by the facts that the more concentrated solutions of the glacial phosphoric acid yield no terhydrate by boiling, while the diluted solutions boiling at a lower temperature, yield some, and that after the addition of nitric acid, the liquid need be but heated to near its boiling point to effect the change completely though more slowly than by boiling. The density of the solution, as will be seen from the above statements, exerts a strong influence in this process; but nitric acid converts both concentrated and diluted solutions into the common phosphoric acid.

It will require more and very careful experiments to determine precisely the way in which nitric acid acts in this case. That nitric acid merely acts as a catalytic agent, seems probable, from the absence of nitrous acid vapors; but it might be possible that a compound between metaphosphoric and nitric acid is formed for a short time, and decomposed again into nitric acid and the common phosphoric acid; or the monohydrated acid might be oxidized to a still unknown oxide, PO_6 or PO_7 , which is instantly decomposed into common phosphoric acid and oxygen, the latter in its nascent state uniting with NO_4 or NO_3 to form nitric acid again. Certain it is, that a small quantity of nitric acid will, with proper precaution to prevent its evaporation, change a considerable amount of metaphosphoric acid; and it acts quite or nearly as quickly upon the pyrophosphoric acid.

Graham, though he does not state so, undoubtedly operated

with diluted solutions of metaphosphoric acid, by which his statement above quoted will be partly explained, and the entire conversion into the terhydrate is merely an oversight, as a partial change only takes place. It is self-evident, that if a portion is thus altered, there ought to be a possibility of altering the whole in a like manner; the difficulty appears to consist in placing the entire solution in the same favorable condition, which is the proper large amount of water, and probably a certain temperature, which, when at the boiling point, induces the change most rapidly. If the proper conditions are ascertained, we may perhaps succeed in converting the entire bulk of a solution into the terhydrated acid; but an important point must be to prevent the formation of the deutohydrate, which, it appears to me, offers under all circumstances more resistance to form the terhydrate, than the pure monohydrate. Both, however, when in solution, succumb to the influence of time and of nitric acid, assisted by heat.

Of the behaviour of the three hydrates in their free and combined state to reagents, we still know too little, though it is an important and at the same time an interesting subject for further researches.

Philadelphia, July, 1861.

EXTRACTUM ANTHEMIDIS FLUIDUM—SYRUPUS ANTHEMIDIS.

BY JOSEPH A. HEINTZELMAN.

Several recipes for Fluid Extract of Chamomile have been published, which are neither equal in strength nor alike in the manner of manipulation.

It is certainly of great advantage, both to the physician and the practical pharmacist, to have equal and uniform formulas even for those preparations which are not yet standard recipes in any of the Pharmacopœias, but frequently called for and valued by physicians and others.

As important as the quality and the selection of the drugs themselves are, it is of no less importance to have proper solvents employed to extract the virtues of plants, and to gain all their active properties without impairing any. Such is the case

with Fluid Extracts and Tinctures in a concentrated form. In arranging those drugs, of which the active properties are to be extracted, we have to examine into their constituents, their volatility, &c., and to select the proper menstrua best adapted as solvents. Nor is it necessary to dissolve the worthless constituents, not having any valuable properties, that we may run the risk to injure the more active ones; which is often the case by employing a too high heat; or exposure to a temperature—cold or warm—too long continued; or substituting heedlessly one solvent agent for another, &c.

The active properties of chamomile flowers depend chiefly on a volatile oil, and bitter extractive, little soluble in water and diluted alcohol, but slightly in alcohol, and very soluble in absolute alcohol. The annexed formula for a fluid extract, according to the measurement—fluid ounce for each troy ounce—has given me entire satisfaction in regard to a reliable strength and quality, and is as follows :

R Flor. Anthemidis 3 viii. Troy.

Alcohol. deodor. (sp. gr. 0.809) Oiii.

Fiat Extr. Anth. fl. 3 viii.

As the flowers make a considerable bulk, no pains should be spared to reduce them to as fine a powder as possible, by grinding and contusion.

Moisten the powder with one pint of deod. alcohol thoroughly, and pack it into a conical percolator of 4 inches diameter, and 16 inches or more in length; to increase the weight of the displacing fluid, I use a heavy iron weight. After six hours' standing, displace with 2 pints deod. alcohol, carefully preserving the first 4 fluid ounces. Evaporate in a porcelain dish the remaining fluid *spontaneously*, at a temperature of 60-70° F. to 4 ounces. As the alcohol evaporates, a greenish resinous matter separates, which increases rapidly towards the end of the evaporation. Put it all carefully into a mortar, and rub it with the first 4 fluid ounces, which dissolve it; then filter, any loss in measure to be made up with deod. alcohol. This fluid extract is of a dark yellowish color, very bitter, and has the odor and taste of the flowers in a remarkable degree.

Syrupus Anthemidis.

℞ Extr. Anthemidis fl. ʒ ii.

Magnes. Carb. ʒ ii.

Sacch. Alb. ʒ vii.

Aq. fervent. q. s. ft. Syr. Anth. Oss.

Rub the fluid Extract of Chamomile intimately with the Carb. Magnesia; add two fluid ounces of the water in small portions, constantly triturating the mixture, and pour it on a small filter; then pour on water carefully until the impregnated water which passes measures four and a half fluid ounces. Dissolve the sugar at a gentle heat and strain. A syrup, thus prepared, is of a straw color, transparent, and of an agreeable, slightly bitter taste.*

Philadelphia, June 24, 1861.

ON CIMICIFUGA RACEMOSA.

BY GEORGE H. DAVIS.

(An Inaugural Essay.)

Sexual System—Pentandria Di-Pentagynia.

Natural Order—Ranunculaceæ.

This is a small, stately plant, having a perennial root, and a simple herbaceous stem, which rises to the height of from four to eight feet. The leaves are large and ternately decomposed, having oblong ovate leaflets, incised and toothed at their margins. The flowers are small, white, and in terminal racemes, with occasionally one or two shorter ones near the base of the plant. The calyx is white, four-leaved, and deciduous; the petals are minute and shorter than the stamens, which are numerous and have yellow anthers; the pistil consists of an oval germ and a

* We would suggest that alcohol followed by diluted alcohol would be more appropriate for the extraction of Chamomile for a fluid Extract. We also dissent from the author's plan of making syrup of Chamomile, if, as he says, it has only a slightly bitter taste. This arises from the fact that the strong alcoholic menstruum does not take up the bitter extractive in full quantity, as, if present, it would be dissolved by the water, and not be influenced by the Carbonate of Magnesia.—EDITOR AM. JOUR. PHARM.

sessile stigma. The fruit is an oval capsule containing a number of flat seeds.

The black-snake root is common to most parts of the United States, growing in open woods and on hill-sides, flowering from May to August, when its long, white, wand-like racemes are very conspicuous.

The root is the part used in medicine. This, as found in the shops, consists of an irregularly contorted or bent thick head or caudex, from one third of an inch, to an inch in thickness, and from one to three inches in length, furnished with many slender radicles, and rendered extremely rough or jagged in appearance by the remains of the stems of former years, which, to the extent of an inch or more remain attached to the root. The color is externally dark brown, almost black, internally whitish.

The ligneous fibres are arranged in a cruciate form, giving the root a tough consistence, and rendering it somewhat difficult of pulverization. The odor, though slight, is peculiar; the taste is bitter and somewhat acrid. Boiling water and dilute alcohol extract its virtues.

Medical Properties.

The medical properties of black-snake root are those of a mild tonic, and capable of increasing the secretions from the skin, lungs and kidneys.

It has been long employed in domestic practice in the treatment of various nervous affections; in chronic rheumatism, in those diseases of the lungs having a resemblance to consumption, and occasionally as an emenagogue. It is most usually administered in decoction made of the usual strength; the dose of which would be a wineglassful, repeated every two or three hours. The powdered root is given in doses ranging from fifteen grains to one drachm.

A tincture made by exhausting two ounces of the powdered root with a pint of diluted alcohol, is sometimes given in doses of two or four drachms.

Chemical Examination.

Four ounces of the powdered root were exhausted with cold water. The infusion had a dark brown color, a slightly bitter

taste, and the peculiar odor of the root. When first prepared it was perfectly transparent, but became turbid on standing for half an hour.

A portion of this infusion when agitated with a solution of corrosive sublimate, let fall a copious precipitate; with another portion, a strong fresh infusion of galls produced a curdy precipitate, and another portion, when boiled and allowed to cool, deposited a flocculent precipitate; tests indicating the presence of albumen.

To another portion of the infusion, a solution of sulphate of copper, and a slight excess of liquor potassa were added. This mixture when boiled for a short time, let fall a beautiful precipitate of sub-oxide of copper; this test indicating the presence of uncrystallizable sugar.

Another portion of the infusion gave a greenish black color, with sesquichloride of iron; a white curdy precipitate with sulphuric acid; and slight precipitates with tartar-emetic and gelatin; tests indicating the presence of tannic acid.

Another portion of the infusion was digested with an excess of gelatin for 24 hours. It was then filtered, and gave no precipitate with sulphuric acid, and gave with sesquichloride of iron a greenish black color, which was entirely dissipated on the application of heat; tests indicating the presence of gallic acid.

To another portion an excess of a solution of gelatin was added, allowed to stand for 24 hours, and filtered to separate the tannic acid. It was then boiled and filtered to separate the albumen, and gave with a solution of subacetate of lead, a flocculent precipitate, indicating the presence of gum.

By the evaporation of the remainder of the infusion, about 25 per cent. of a dark brown extract was obtained. This, when submitted to the action of alcohol and ether, successively, left 75 per cent. of a dark brown, slightly bitter extractive matter.

A portion of the root which had been treated with cold water, was boiled for 15 minutes with about four times its weight of water. The filtered decoction gave, when cold, an indigo-blue color with tincture of iodine, indicating the presence of starch.

1750 grains of the finely powdered root were exhausted with alcohol of .835. The tincture thus obtained, was evaporated by

means of a water bath to a syrupy consistence, and thrown into water. The precipitated resin was collected on a filter, and when well washed and dried was found to weigh 116 grains. This, when triturated with ether until it was no longer taken up, left 57 grains of a light brown resin insoluble in ether. This was redissolved in alcohol; the solution agitated with animal charcoal, until it became colorless, filtered, and allowed to evaporate spontaneously. The resin, as thus obtained, was nearly white, soluble in alkaline solutions from which it was precipitated on the addition of acids.

The ethereal solution was agitated with animal charcoal, until it became colorless, filtered, and by spontaneous evaporation, yielded the resin having a slightly greenish tinge. It was found to be soluble in alkaline solutions, from which it was precipitated on the addition of acids; this indicating the presence of a resin soluble in ether.

The root which had been treated in the former experiment with alcohol, was now exhausted by percolation with ether. The ethereal solution was evaporated to a small bulk, and thrown into water, when a very small amount of a fatty matter separated and floated on the surface of the water. It was absorbed by bibulous paper, to which it communicated a greasy stain which was not dissipated by heating; this indicating the presence of a small amount of fatty matter.

During the evaporation of the ethereal solution, a small quantity of a brown waxy matter was deposited on the sides of the evaporating dish.

A quantity of the root was reduced to a coarse powder, and macerated with sufficient water to moisten it, for 24 hours, transferred to a retort and distilled. The liquid which passed over was agitated with ether; the ethereal solution drawn off and allowed to evaporate spontaneously. By its evaporation, a very small quantity of an oily liquid was obtained. It possessed in a marked degree, the peculiar odor of the root, and communicated to bibulous paper a greasy stain, which was entirely dissipated by the application of heat; this indicating the presence of volatile oil in small amount.

The presence of green and brown coloring matters was proved by the action of animal charcoal on the two resins.

2500 grains of the root when submitted respectively to the action of cold and boiling water, alcohol, ether, dilute acids, and alkaline solutions, left 540 grains of a dark brown lignin, which was converted by sulphuric acid into a pasty mass, which was soluble in water.

Inorganic Constituents.

Fourteen hundred and forty grains of the root, when incinerated, yielded 120 grains of a light colored ash. A portion was lixiviated with boiling water; the solution evaporated to dryness, the product thus obtained redissolved in boiling water and filtered. When a portion of the solution was added to a solution of tartaric acid, carbonic acid was given off, and a white precipitate of bitartrate of potassa was obtained. Another portion, when neutralized with nitric acid and evaporated, yielded a salt having the appearance of nitrate of potassa, of a saline cooling taste, and which deflagrated when thrown on burning coals. Another portion of the solution gave with a solution of chloride of barium, a white precipitate which was but partially soluble in nitric acid. With another portion of the solution, nitrate of silver produced a curdy precipitate which blackened on exposure to the light, and which was entirely soluble in aq. ammonia. The foregoing tests proving the presence of carbonate and sulphate potassa, and chloride of potassium.

The insoluble portion of the ash was treated with dilute nitric acid, with the evolution of carbonic acid, proving the presence of a carbonate insoluble in water.

A portion of this acid solution, when neutralized with carbonate of ammonia, gave with a solution of phosphate of soda a white precipitate of the double phosphate of magnesia and ammonia.

With the remainder of the solution, a solution of oxalic acid produced a white precipitate of oxalate of lime.

The portion of the ash which remained after heating it with the dilute acid, was subjected to the action of the strong acid.

This solution gave with a solution of ferrocyanide of potassium, a blue color, indicating the presence of a salt of iron.

The insoluble portion of the ash was well washed with water, and then with a boiling solution of potassa. With this solution,

dilute acids produced a white precipitate, which, when dry, was found to be insoluble in water and dilute acids, indicating the presence of silica.

From the foregoing experiments, the organic constituents of *Cimicifuga*, are:—1, albumen; 2, uncrystallizable sugar; 3, tannic acid; 4, gallic acid; 5, gum; 6, extractive; 7, starch; 8, resin soluble in alcohol, and insoluble in ether; 9, resin soluble in alcohol, and soluble in ether; 10, fatty matter; 11, waxy matter; 12, volatile oil; 13, green and brown coloring matters; 14, lignin.

The inorganic constituents are salts of potassa, magnesia, lime, iron and silica.

ON KEROSOLENE.

A recently discovered Anæsthetic.

BY EDWARD PARRISH.

Some of the most useful scientific and practical discoveries have originated in accidents, the first results of which have involved disappointment or inconvenience—to evolve from these the lessons by which they may be made to subserve useful ends, should be one of the chief aims of the experimentalist.

To the accidental anaesthetic effects produced upon a workman employed to clean a cistern in a Kerosene Oil Works in Boston, we owe the recent discovery of a new use for an abundant product of the destructive distillation of coal; this product, though heretofore procured in a crude condition at a certain stage of the process, in the works alluded to and perhaps in others, has not until recently been rectified and thrown into the market, because no demand existed for it, for any known use of which it was capable.

With the enterprise so characteristic of New England character—a trait which so happily gave to science and humanity one of the greatest blessings of modern times—ether as an anæsthetic—the Boston physicians have taken measures to investigate the utility of this article for similar purposes, pending which it naturally claims the attention of pharmaceutists in its physical and chemical characters.

Two bottles of the liquid have been sent me, the first by a medical friend residing in Massachusetts, and the second, at my request, by the manufacturer, Joshua Merrill, superintendent of the Downer Kerosene Oil Co., from whom I learn that *Kerosolene*, as it is named, is a product of the destructive distillation of "Albert coal," at temperatures varying from 600° to 890° F. The very volatile portion, separated by careful fractional distillation from the more fixed products which are sold as kerosene, is purified so as to remove its unpleasant odor, and thoroughly rectified.

As thus produced, kerosolene is a tasteless, colorless, though highly refractive, inflammable liquid, burning with a bright smoky flame; it is very mobile and volatile, and the bead disappears immediately. A vial when grasped by the palm of the hand, gives off small bubbles of vapor, raising the stopper; its odor is very faint, reminding of chloroform at first, though less agreeable as it evaporates, leaving not the slightest odor when it dries. Its sp. gr. varied in the two specimens as first received, that of No. 1 being .6346 at 76° F., of No. 2, .6325 at 72° F., but by exposure for two weeks in a partly filled tincture bottle, occasionally opened, the specimen marked No. 1, reached a sp. gr. of .6420 at 72° F.

From the last named fact and its known origin and mode of preparation, it would be supposed that this liquid had not a uniform composition, but must be a mixture of different carbohydrogens of varying density and volatility; the truth of this was proved by the following experiments: Specimen No. 1 was heated in a water bath, and its boiling points carefully noted. At 84° F. it commenced to boil, the temperature rapidly rising to 90°, and afterwards slowly, without becoming stationary, to 150°, when boiling ceased, about one-sixth of the original liquid remaining which was evaporated at about 200° without boiling. Specimen No. 2 was subjected to similar experiments; it commenced to boil at 82° F., ceased at 94°, recommenced at 100° and ceased at 105°, when the remainder, about two-thirds, was evaporated without boiling, at a temperature not exceeding 180°.

The extremely low sp. gr. of this substance and the temperature at which it begins to boil forbid the idea of its containing

the ordinary coal tar products in considerable proportion. The light naphtha first obtained in the distillation of coal tar has a sp. gr., according to Mansfield, of .900 to .950, and when purified by agitation with sulphuric acid and potash, or by the process of Gregory, in which peroxide of manganese is used, and rectified, its density does not fall below that of benzine, the sp. gr. of which, in its liquid form, is variously stated at .85 and .8991, at different temperatures.

The largest proportion of Kerosolene is evidently composed of those very light carbohydrogens not present in coal tar, and not produced at the high temperatures employed in the production of illuminating gas.

In the books I have consulted I find no detailed account of these almost gaseous liquids, and I can imagine no subject presenting more difficulties to the chemist. Prof. Antisell, in his thoroughly practical work on Photogenic and Hydrocarbon Oils, remarks that "the specific gravity and chemical constitution of the light and heavy oils vary in relation to the temperature at which they are distilled; and perhaps no two distillations, give exactly the same relative mixture of the various hydrocarbons of which they are composed." The composition of these is further varied by the nature of the crude materials, which may be highly bituminous like the "Albert coal," from which the specimens under consideration were obtained, or more completely formed coals like the more common varieties.

The proportion of matter volatile at redness in the "Albert coal" has been stated at 61.74 per cent., that of the "Breckenridge coal," of Kentucky at 60.27 per cent., while Pittsburg coal yields but 32.95 per cent.

Chemists have obtained from coal tar by fractional distillation several substances of great utility. Of these, benzine or benzole $C_{12}H_6$, which, as before stated, is the chief constituent of the light naphtha, is also a constituent of kerosolene, as ascertained by testing it with nitric acid, which developed the odor of nitrobenzole. The chief constituents of the photogenic liquids as thrown into commerce under the name of Coal oils or kerosolene, are Toluine $C_{14}H_8$, which has asp. gr. of .870 and boiling point 237° F., (Gerhardt .230,) and Cumene $C_{18}H_{12}$, which is also lighter than water, and boils at $.814^{\circ}$; it is not im-

probable that traces of these may be present in the new liquid, though they vary from it so much both in sp. gr. and boiling point. Experiments to detect Aniline $C_{12}H_7N$, in the specimens under examination failed to indicate it as might be anticipated, its sp. gr. being stated at 1.020, and the process of rectification with sulphuric acid being adapted to separate any alkaloids if originally present.

Compared with the commercial article of benzine, now so extensively sold, kerosolene presents several marked points of difference; three specimens of benzine I have examined have respectively, at 60° F., the sp. gr. .7521, .7661, and .8708; these differ in sensible properties from each other almost as much as they do from kerosolene. The most agreeable in odor I imported from England at a much higher price than that paid for the American varieties, which I have generally found disagreeably "balsamic," sometimes resembling impure illuminating gas, and leading to the belief that the gas was escaping into the room; one specimen became almost intolerable by age, while the color became gradually yellow. Kerosolene, as before stated, is almost free from odor, it is so very mobile, light and colorless that it could not be mistaken for benzine, and still less for kerosene, its properties having relations to the latter substance not unlike those of ether to oil of turpentine.

Under the name of Eupion, chemists formerly described a product of the destructive distillation of wood, which was believed to be C_6H_6 , but it has since been shown by Voelckel that the portions rising below 212° F. consisted chiefly of acetate of methyl with acetone, a little benzine, xylite and mesite.

The sp. gr. of eupion was stated at .655, its boiling point at 118° F., rising as high as 336° in some samples. Though stated to be the lightest of known substances, it will be seen that this product was rather more dense than our new carbohydrogen product. Accounts differed in regard to its miscibility with water and alcohol, it was, however, described as freely miscible with ether and oils, and as being of a faint and agreeable odor and without taste, which properties correspond with those of the liquor under consideration. That kerosolene contains no more than a slight trace of any oxygenated body was shown by

immersing sodium in it, a fresh surface of the metal was only slightly tarnished by the contact.

The solvent properties of this new substance are of course of primary importance, they appear to me to present the true key to its usefulness. It dissolves fixed oils, apparently, in all proportions, common resin freely, though with flocculent residue, wax and cocoa-butter freely, mastich and caoutchouc slightly. It mixes freely with alcohol, oil of turpentine, ether and chloroform, but not with water. Iodine dissolves in it sparingly, yielding a remarkably rich, though changing, purple color.

For the common uses to which benzine is now applied kerosolene appears to be equally adapted; by the absence of disagreeable odor it is rendered generally preferable; it is, however, unsuited to the purposes of illumination, or to generating heat, being too volatile, though its vapor does not appear to be explosive. Its extreme volatility makes it important that it should be excluded from the kerosene or other photogenic oils, and renders it a residuary product, heretofore without value, of those works in which it has been produced in a crude condition.

How far this product could be furnished by the manufacturers, of uniform quality, or whether it could be produced at other kerosene works, and by those numerous establishments in which the so-called rock oils now pumped in such vast quantities in the western slopes of the Alleghanies, are rectified, is a practical question yet to be tested; its relations are evidently to this class of bitumens rather than to coal tar.

In view of its use in medicine, the fact of the great uncertainty of its composition, its being a mixture of different and undetermined proximate constituents, must interfere with its general adoption and recognition.

The physiological effects of kerosolene, will probably be reported on at length by Dr. H. J. Bigelow, of Boston, to whom we are indebted for the first published account of it, from which, as contained in the Boston Medical and Surgical Journal, under date of July 11th, 1861, the following extract is made:—

“A few whiffs were sufficient assurance of its efficacy as an anaesthetic, which, with its other qualities, as I ventured to remark, would place the kerosolene beyond any known anaesthetic, provided its use was not followed

by headache, vertigo, or other unpleasant symptoms, and provided it should prove as free from danger as ether.

Subsequently, I inhaled the new vapor, which Dr. Hodges, at my request, administered. Complete insensibility supervened, lasting several minutes, with some diminution of the volume of the pulse. Its effect was wholly agreeable, leaving neither headache nor nausea, nor bad taste.

I have this morning administered it to three surgical patients. The first, a girl of 19, presenting some hysterical tendencies, having thrust some twenty needles in her leg, was wholly insensible during the extraction of four of those which remained. Yet there was more cough than I had expected from the wholly unirritating odor of the vapor, more muscular rigor than usual in favorable anesthesia, and more intermittence of the pulse.

In a second patient, to whom it was given preparatory to an operation upon the face, insensibility was equally complete. But this woman did not take it kindly, and its complete effect was attended by so feeble and intermittent a pulse as to lead me to desist until she had recovered. A second attempt reproduced, with anesthesia, the feeble and intermittent pulse, and I again desisted. Upon her recovery, I gave her common ether vapor, which she afterwards said was less agreeable, but which was followed by complete insensibility, the pulse beating steadily and full, at 76. Though this patient perhaps succumbed more readily to a third anesthesia, there seemed to be in the two first trials a certain degree of purple color and asphyxia, with its attendant spasm, which I have elsewhere described as an occasional and disagreeable symptom of attempted anesthesia. To guard against this asphyxia, which might possibly have resulted from the folded towel, upon which I habitually administer ether, I tried in the next case an open sponge. The subject required a considerable incision for a mammary abscess, and was a patient of Dr. H. G. Clark, with whose assent I tried the kerosolene. In spite of the open sponge, the symptoms of asphyxia again appeared, suggesting to Dr. Clark, before operating their resemblance to those resulting from charcoal gas. The color was livid, and the rigidity marked. In each of these cases, the quantity used was from one to two ounces."

This testimony suggests so much caution in the inhalation of kerosolene vapor, that I have not found the physicians to whom I have presented samples, eager to make trial of it. My friend, Dr. Thomas George Morton, gave it in four or five instances to full grown cats; in no case did it appear completely to destroy sensibility, though it seemed to deaden pain, and generally if the sponge was applied about 15 minutes to the animal, convulsions and violent twitchings resulted. To this I may add the testimony of my colleague, J. M. Maisch, who made the experiments I have mentioned on its boiling points, and un-

avoidably inhaled a portion of its vapor; his symptoms were described as first a pressure on his eyes, then pain in the temples, gradually ascending to the top of the head, where he continued to experience its unpleasant effects till relieved by a night's rest. In a second instance he had similar symptoms, though not so severe or persistent, leaving him in less than three hours.

In this connection I may advert to a curious discrepancy between Gmelin's Hand-book of Chemistry, as originally published in German, and Watt's English translation, published by the Cavendish Society. In the original, an observation of Snow is recorded that benzine vapor is narcotic (narkatisviend), while in the translation, vol. xi. p. 137, the observation is stated thus, "Its vapor does not produce narcotic effects when inhaled."

GLEANINGS FROM THE GERMAN JOURNALS.

BY JNO. M. MAISCH.

Urate of Soda was obtained by Dr. Baumgarten, of St. Louis, in microscopic transparent globules, resembling oil globules, by boiling soda with excess of uric acid, cooling, filtering and mixing the filtrate with a cold saturated solution of phosphate, bicarbonate, acetate, nitrate or sulphate of soda, or of chloride of sodium. After the removal of the salt by washing, the urate changes from its utricular condition into needles, both of the composition $\text{NaO}_2\text{C}_{10}\text{H}_2\text{N}_4\text{O}_4 + 3\text{HO}$.—(Ann. d. Ch. und Pharm. xli. 106-109.)

Inosite.—Dr. L. Cooper Lane, of San Francisco, California, evaporates the infusion of the organs to a thickish liquid, mixes while boiling, with 3 or 4 volumes of alcohol, decants or filters, and sets aside to crystallize. If no crystals appear, the clear tincture is mixed with ether until a permanent turbidity remains. After 24 hours, all the inosite has crystallized in pearly scales. The alcoholic precipitate in the aqueous liquid on redissolving in water and treating with alcohol, will yield more inosite. If many other substances are present, it is advisable to precipitate first with acetate, then with subacetate of lead, decompose the latter precipitate by sulphuretted hydrogen or oxalic acid, and

treat the filtrate as above.—(Ann. d. Ch. und Pharm. xli. 118-120.)

Pus from an abscess on the right hip of a man was pale yellowish, thickish cream-like, faintly alkaline, and free from disagreeable odor; spec. grav.=1.022. C. Giesecke found it to contain 88.76 water and 11.24 solid substances, of which 10.12 were organic, 1.12 of inorganic natures, namely

4.38 albumen dissolved in the serum.

4.65 pus-corpuscles, mucus, together with little leucine and glutine.

1.09 cholestearine with some neutral fat.

0.59 chloride of sodium.

0.82 soda (combined with albumen) with little phosphate of soda and sulphate of potassa.

0.21 phosphates of magnesia, lime and protoxide of iron.

88.76 water.

100.00

(Ann. d. Ch. and Pharm. xli. 110.)

Specific gravity of Ammonia.—By operating with perfectly anhydrous ammonia, and after making the necessary corrections, Professor Jolly, of Munich, found the spec. grav. of liquid ammonia at 0° C., and compared with water of the same temperature=.6239, .6261, .6193, average =.6234, or one-sixth less than observed by Faraday. The specific gravity of the gas, compared with air of 0° C., and 715 m. m. pressure was found =.558, .576, .565.—(Buchn. N. Report. x. 115-124.)

Use of Cyanide of Barium.—Margueritte and de Sourdeval prepare this salt from baryta under the influence of atmospheric nitrogen. Prof. Dr. R. Wagner now proposes it for the preparation of hydrocyanic acid by decomposing it with dilute sulphuric acid. With superheated steam it yields 18 per cent. ammonia and carbonate of baryta, from which cyanide of barium may again be readily made; by boiling with water, particularly under a high pressure, it is changed to formiate of baryta, yielding formic acid by the addition of sulphuric acid; superheated steam impregnated with carbolic acid, when passed over

the cyanide, yields anilin, and alcohol under a like condition, ethylamin.—(Buchn. N. Rep. x. 131, 132.)

To prevent mistaking Strychnia for Santonin, Dr. Henkel, of Tübingen, suggests to use in medicine only such santonin which has turned yellow in contact with the light; he believes it to have the same properties as the unchanged.—(Buch. N. Report. x. 132.)

Pure Carbonate of Soda is prepared by F. F. Jordan, of Cronstadt, Russia, by granulating sal soda twice, allowing the mother liquor to drop off upon a funnel, washing the crystalline mass with a little cold water, and finally, slowly with alcohol, until this ceases to take up table salt; the residue may be recrystallized.—(Buchn. N. Rep. x. 133.)

Salep.—Prof. Buchner states that C. W. Barnickel, pharmacist in Remlingen, near Wurzburg, prepares a very excellent salep from several species of Orchis, by digging the tubers, after the plants have been in flower, dipping them in boiling water, to remove the brown epidermis, and then drying the tubers carefully and rapidly upon hot sheet iron stoves.—(Buchn. N. Rep. x. 134.)

Test for Sulphurous Acid.—The acid is to be tested in neutral solution. Prof. Boedecker prepares the test liquid by mixing a considerable quantity of solution of sulphate of zinc with very little nitroprusside of sodium; this produces in a solution of a sulphite a rose or dark red coloration, increasing in intensity by a little ferrocyanide of potassium, by which a beautiful purple precipitate will appear, if the quantities are not too minute. Acids and alkalies prevent the reaction; bicarbonate of soda is without effect.—(Ann. d. Ch. und Pharm. xli. 193-195.)

Volumetric estimation of Phosphoric Acid and Arsenic.—Boedecker prepares the uranic nitrate, already proposed as a test by Leconte, by dissolving 20.2817 grm. of pure dry uranic oxide in nitric acid, and sufficient water to make one litre; each cub. c. m. requires 5 milligr. PO_5 for complete precipitation. Besides the alkalies, no base but lime, baryta, strontia, magnesia and oxide of zinc may be present. The solution is first mixed with

ammonia, and afterwards acidulated with acetic acid; the test liquid is now added and well stirred in, until a drop just produces a brown color, with a drop of ferrocyanide of potassium. The excess which is necessary to produce this brown color, is determined from acetate of ammonia acidulated with acetic acid, to which the uranic nitrate is added until the same color is produced with ferrocyanide of potassium; for 50 c. c. m. of liquid it will be about .8 c. c. m. This method is very convenient in the analysis of urine.

1 c. c. m. solution of uranium is equivalent to 5.281 m. grm. As. In the presence of arsenic and phosphoric acids, both may be estimated together, and after precipitating the arsenic by HS, the phosphoric acid alone. The difference will indicate the quantity of uranium necessary for the arsenic.—(Ann. d. Chem. and Ph. xli. 195-200.)

Arendt and Knop recommended uranic oxide for the same purpose in 1856 (Centralbl.) and Pisani lately in Comptes Rend. lii. 72, 106.

Estimation of Acids in Salts.—E. Langer and R. Wawnikiewicz, have been induced by Professor Bunsen, to experiment with acidimetric liquids for the estimation of acids combined with bases that are precipitated by potassa or carbonate of soda; the excess of alkali is corrected by normal hydrochloric acid. Experimenting with pure nitrates and sulphates, they have found that carbonate of soda will answer for salts of baryta, strontia, zinc, lead, bismuth, nickel, alumina; potassa was used for salts of copper, silver, ammonia and iron.—(Ann. d. Chem. und Ph. xli. 230-238.)

The titration of tin is effected by Stromeyer, by dissolving it in hydrochloric acid and immediately mixing it with sesquichloride of iron; $\text{SnCl} + \text{Fe}_2\text{Cl}_3 = \text{SnCl}_2 + 2\text{FeCl}$. The protochloride of iron is oxidized by permanganate of potassa, 1 equiv. oxygen represents 1 equiv. tin.

Tin dissolved more readily in a somewhat concentrated solution of ferric chloride, containing some free acid without evolving hydrogen. $\text{Sn} + 2\text{Fe}_2\text{Cl}_3 = \text{SnCl}_2 + 4\text{FeCl}$; in this case 2 oxygen represent 1 tin. The tin must be free from other metals.—(Ann. d. Ch. und Pharm. xli. 261-264.)

Fluorine in the ashes of Lycopodium complanatum was discovered by Prince Salm-Horstmar. The fresh plant yielded 6 per cent. ashes, 100 grms. of which contained .4 grm. Fl, or the part soluble in HCl .27, the insoluble portion (silica) .15 grm. Fl. In oats and straw he found baryta.—(Poggend. Ann. cxii. 329. Buchn. N. Rep. x. 38, 79.)

Estimation of free Carbonic Acid in water.—Prof. Dr. Pettenkofer mixes 100 c. c. m with 3 c. c. m. of a nearly concentrated solution of chloride of calcium, to decompose alkaline carbonates, and with 2 c. c. m. of a saturated solution of chloride of ammonium, to retain magnesia in solution, and finally with 45 c.c.m. lime water of known strength. In 12 hours the amorphous carbonate of lime becomes crystalline and insoluble; now 50 c.c.m. (one-third) of the clear liquid is neutralized with normal oxalic acid, and another third may be used for a controlling second experiment. The difference in the amount of acid required for neutralizing this mixture and the original lime water, indicates the free carbonic acid, that is, all uncombined acid, and all over and above that requisite for the formation of monocarbonates. Waters very rich in carbonic acid are previously diluted with a known proportion of boiled distilled water.—(Buchn. N. Rep. x. 1-9.)

Solubility of Sulphate of Ammonia.—Dr. A. Vogel found that 1 part of this salt, dissolved at ordinary temperature in 1.3 p. water.—(Buchn. N. Rep. x. 9-11.)

Conversion of Theobromina into Caffeina.—Prof. Strecker has succeeded in this conversion by heating in a sealed tube the compound of theobromina and oxide of silver, with iodide of methyle, and crystallizing the alkaloid from alcohol. $C_{14}H_{8}N_4O_4 + AgO + C_2H_5I \text{ yield } C_{16}H_{10}N_4O_4 + HO + AgI.$

Theobromina.

Caffeina.

(Buchn. N. Rep. x. 32.)

A new iodine spring, near Partenkirchen, on the foot of the Bavarian Alps, has been discovered. Professor Buchner states that it contains the iodine as iodide of sodium, somewhat less than the celebrated Heilbrunn spring. It contains, beside this,

carbonate of soda, and a considerable amount of sulphuretted hydrogen.—(Buchn. N. Repert. x. 31.)

Antimony in Arsenious Acid.—Arsenious acid obtained by repeated sublimation at Andreasberg, was found by Dr. A. Streng to consist of 98.20 AsO_3 and 1.68 SbO_3 .—(Chem. Centralbl. v. No. 48. Buchn. N. Rep. x. 36.)

Dalleochine or Quinine Green.—10 grm. sulphate of quinia, 1000 grm. water, .128 litre solution of chlorinated lime, .032 lit. muriatic acid, and .192 lit. liquor ammoniae are heated to 20° R. (77° F.) and after cooling, filtered. The dalleochine has the appearance of a green resin, is fusible, insoluble in water, benzine, oil of turpentine, bisulphide of carbon and ether, but soluble in alcohol, wood spirit and glycerin. Acetic acid imparts to it a blue color, nitric, muriatic and sulphuric acid dissolve it with a brown color, the green being restored on neutralization. Its solutions are precipitated by caustic alkalies, by corrosive sublimate, pale green; decolorized by protochloride of tin; nitrate of silver and alum have no reaction. The alcoholic solution, diluted with water, dyes silk, woolen and cotton, the latter with a mordant of albumen.—(Dingl. Polyt. Journ. clix. 66, 67. Ch. Centralbl. vi. 224.)

A double salt of carbonate of lime and chloride of calcium, $\text{CaCl} + 2\text{CaO}$, $\text{CO}_2 + 6\text{HO}$ was observed by J. Fritzsche in chloride of calcium prepared for technical purposes; it was in microscopic prisms, which are readily decomposed by heat and by water. It may be obtained by adding ammonia to a very concentrated solution of chloride of calcium and exposing it to the air.—(Bullet. do St. Petersb. iii. 285-292. Chem. Centralbl. vi. 225-227.)

Composition of Gutta Percha.—E. H. v. Baumhauer found gutta percha to consist of $\text{C}_{20}\text{H}_{16}$, and several products of oxidation, among which he proved to be $\text{C}_{20}\text{H}_{16}\text{O}$, $\text{C}_{20}\text{H}_{16}\text{O}_2$, and formic acid. Oxidation is the cause of gutta percha becoming brittle.—(Journ. f. pr. Ch. lxxviii. 298. Wittst. V. Schr. ix. 563-567.)

Lead cerate.—Eggenfels prevents this cerate from turning

yellow, by manipulating as follows: The wax and oil are fused in a water bath, the subacetate of lead, previously heated, is added in small portions, the mixture well stirred and digested for some time; finally the rose water previously heated, is added. A partial saponification and a subsequent emulsion takes place, the cerate retaining its original white color.—(N. Jahrb. f. Ph. xiv. 367. Wittst. V. Schr. x. 268.)

Arsenic in muriatic acid was found in 1840, by Wittstein, to be completely removed by mercury. Reinsch subsequently found copper to act in a similar manner. The grey crust with which copper becomes covered, he supposed to be pure arsenic. Lippert now proves it to consist of 32As and 68Cu=Cu₅As; it evolves but little arsenic on being heated, and in a current of hydrogen, arsenic does not sink to less than 20 per cent.—(Wittst. V. Schr. x. 267, 268.)

Corn plaster.—1 oz. powdered galbanum and 10 gr. turpentine are softened at a moderate heat, 8 gr. finely powdered sal-ammoniac are added, and the mass rolled out without employing oil or water; the plaster is to be kept in wax paper or bladder. After taking a foot bath, the plaster spread upon soft leather is applied, and renewed every other day after removing the horny skin.—(Müller's Ph. Zeit. 1861, No. 1. Wittst. V. Schr. x. 265, 266.)

Medical properties of Metamorphia.—Dr. Fronmüller employed Wittstein's metamorphia as a soporific in 7 cases, in doses of $\frac{1}{2}$ gr.; the result was in 5 cases complete, in 2 partial. The muriate was employed in 4 cases at $\frac{1}{2}$ gr. and in 1 case at 1 gr. The result was in three cases complete, in 1 partial, and in 1 unsatisfactory.—(Wittst. V. Sch. x. 262.)

Coloring matter in Acetic Acid.—Phosphate of alumina dissolved in potassa ought to yield a white precipitate with acetic acid. Wittstein observed it frequently to be pale red, but to turn white by ignition. The colorless acetic acid, therefore, still contains an empyreumatic coloring principle, probably one of the series of pyrrhol.—(Wittst. V. Schr. x. 259.)

Hemlock among Aniseed has been observed. In the Romagna,

hemlock grows among anise, and the harvesting of the latter is done with but very little care. Hemlock seed is larger than anise seed, and has prominent crenated ribs.—(Pharm. Zeit. 1860, No. 51. Wittst. V. Schr. x. 254.)

Citrate of Magnesia.—The granular powder, made in Paris, and sold in Greece under this name, is composed, according to X. Landerer, of 360 gr. bicarbonate of soda, 20 gr. citric acid, 300 gr. tartaric acid, 72 gr. sulphate of magnesia, .5 gr. oil of lemon. The tartaric acid and bicarbonate of soda are heated in a porcelain dish just to fusion, allowed to cool and then mixed with the other ingredients.—(Wittst. V. Schr. x. 218.)

Lotour or latour bark, which resembles false angustura bark, is employed by oriental dyers for heightening the color of cochineal; it is bitter, and is rendered blackish-green by salts of iron. The surgeons of the French African army, when stationed in the Piraeus, employed the bark of *Strychnos nux vomica*, under the name of *Cortex simarubae*; this resembles latour bark very closely, and Landerer supposes the latter to be likewise the bark of *Strychnos nux vomica*.—(Wittst. V. Schr. x. 219.)

Mummies are employed, according to Landerer, by the Oriental empirics, in rheumatic and arthritic complaints, in the form of ointment, composed of oil and powdered mummy. The powder taken internally with wine, is regarded as diaphoretic.—(Wittst. V. Schr. x. 218.)

Morphia and Marsh Mallow Syrup.—E. Janota observed that acetate of morphia is soon decomposed by marsh mallow syrup, and entirely destroyed; simple syrup is preferable.—(Oest. Zeit. f. Ph. 1860, 16.)

Fermentation of Sugar of Milk.—From a series of experiments made by Dr. R. Luboldt, under the supervision of Prof. E. Mitscherlich, the author derives the following conclusions:

1. Sugar of milk ferments very slowly; it is not previously transformed into fruit sugar.
2. Between 15 and 35° C. (59 and 95° F.) alcohol is always formed besides lactic acid; neutralization of the acid merely decreases, but does not arrest the formation of alcohol.

3. There is no regular proportion between the lactic acid and alcohol; the more diluted the solution of milk sugar, the more rapidly fermentation sets in, and the more alcohol is formed.

4. The estimation of alcohol is scarcely possible, inasmuch as all conditions are present for its oxidation to acetic acid.

5. The little cheese contained in the whey of milk, supplies the ferment, which soon finishes the process of vegetation, and then ceases to exert any influence, which is proven by concentrated solutions.—(Wittst. V. Schr. x. 207-214.)

Reaction of Quinia.—Dr. Leube confirms the reaction first observed by Brandes and Vogel; a beautiful red color is produced on shaking $\frac{1}{2}$ gr. sulphate of quinia with 2 drachms chlorine water, and adding 5 or 6 drops of ferrocyanide of potassium and 4 or 5 drops of ammonia; the color disappears by muriatic acid, but is reproduced by ammonia. Leube employs the same test for proving the presence of quinia in cinchona barks. He digests 1 drachm powdered cinchona, with 15 drops dilute sulphuric acid, and 2 oz. boiling water for 15 minutes, cools by setting the vessel in cold water, and adds to 1 drachm of the filtrate, 1 drachm chlorine water, 1 drop concentrated solution of ferrocyanide of potassium, and 1 drop ammonia; after shaking, a scarlet red color or precipitate is formed. Diluted solutions of quinia require for 1 drachm but 8 drops chlorine water and 1 drop each of the ferrocyanide and ammonia. 1 gr. sulphate of quinia in 16 oz. water may thus be detected, and likewise quinia adhering to cinchonia salts.—(N. Jahrb. f. Ph. xiv. 161.)

Dr. Flückiger (Schweiz. Zeitschr. f. Ph. vi. 65), confirms these observations, and adds, that chlorine water and ferrocyanide of potassium may be substituted by 1 drop of ferridcyanide of potassium; 1 drop of ammonia will then produce the same reaction in infusions of bark, but not in solutions of quinia; in the latter case, however, the coloration will appear by using chlorine water, ferridcyanide instead of ferrocyanide of potassium, and ammonia.

Examination of Cochineal.—The W. Gewerbezeitung, No. 8, recommends the following method for estimating the value of cochineal: 3*i.* cochineal is treated with 3*i.* hot water and 3*ss.* solution of potassa; 3*i.* water is added to the solution, and grad-

ually so much of a solution of 5 grs. pure ferrocyanide of potassium, until the purple color has changed into yellowish-brown, which is best observed in a drop being placed upon a white surface. The quantity of ferrocyanide used indicates the relative value.—(Schw. Zeit. f. Ph. vi. 15.)

Hydrargyro-iodide of Arsenic, prepared by rubbing together 790 gr. iodine, 470 arsenic, and 101 mercury with a little alcohol, must be protected from the light and air, otherwise bin-iodide of mercury separates in crystals, arsenic oxidizes and iodine is sublimed. Landerer recommends to prepare it ex tempore from the iodides of arsenic and mercury.—(Schw. Zeits. f. Ph. vi. 33.)

Recognition of Phosphates in urinary deposits.—Landerer recommends for this purpose to boil the sediments in diluted nitric acid, and add molybdate of ammonia, when the characteristic yellow precipitate of phospho-molybdate of ammonia appears.—(Schw. Zeits. f. Ph. vi. 34.)

Separation of Acetic Ether.—W. Engelhardt mixes the distillate obtained from acetate of soda, alcohol and sulphuric acid, with an equal weight of water, and dissolves in this liquid chloride of sodium to saturation, after previously neutralizing the free acid by magnesia. The acetic ether separated after 12 hours, has a spec. grav. of .89, and requires 7 parts of water for solution.—(Polyt. Notizbl. 1860, No. 23. Schw. Zeits. f. Ph. vi. 45.)

GLEANINGS FROM THE FRENCH JOURNALS.

BY THE EDITOR.

On the influence of the color of glass bottles on their contents, by M. Dumey.—In view of the custom now in vogue of employing blue glass for the purpose of counteracting the effects of light on chemical and organic substances, M. Dumey calls attention to the fact, that such glass has no action on the chemical rays, and that blue glass is not better than white glass for that purpose. But excellent results are obtained when red glass is employed, as the most easily effected substances undergo no

change from this agency when kept in red glass bottles. The author thinks that many bottles in the shop should be made of glass of this kind to prevent the destructive action of light on certain officinal preparations.—(*Répertoire de Pharm.*, June, 1861.)

On the action exercised on Phosphorus by the aromatic principle of Tar, by M. Deschamps.—If tar is put in a wide-mouthed bottle, and allowed to stand awhile with the mouth closed, so that the air enclosed shall become penetrated with the odorous portion of the tar, the air ceases to exert any action on phosphorus when a small mass of that substance is suspended in the bottle, neither vapors or luminosity in the dark are observable. To explain this phenomenon either the air must be deprived of its oxygen, a supposition wholly untenable, or, the tar must act simply by its presence. This last appears to be the true state of the case, as the oxygen is simply rendered inactive or paralyzed by the aromatic particles of the tar. The author details several experiments which prove this power of tar, but shows that it is also possessed by the volatile oils of mint, lemon, turpentine, benzine, ether, &c. Whilst the oils of cloves, anis, and mirbane, and chloroform, idoform, musk, tolu and benzoin have no action.—(*Répert. de Pharm.*, Mai, 1861.)

Chloroform for masking the taste of substances, by M. Grave.—The author has observed what he considers a new property of chloroform—that of modifying the taste of substances, as for instance, removing the bitterness of bitter substances. Mixed in certain proportions with tincture of aloes and gentian, and with sulphate of quinine suspended in water, chloroform deprives them almost entirely of bitterness. He leaves for others to ascertain to what extent it modifies the properties of these substances.—(*Rép. de Pharm.* Mai, 1861.)

Abortion in Cows occasioned by the ingestion of Ustilago mavis.—This Ustilago is a parasitic mushroom, which occurs on maize as ergot does on rye. In a cow-house, where cows were fed on Indian corn infested with this parasite, eleven of their number aborted in eight days. After their food was changed, none of the others aborted. The better to be convinced of the

poisonous nature of these mushrooms, the author, after having dried and pulverized them, administered six drachms to two bitch-dogs with young, which soon caused them to abort.—(Annal. Méd. vetr. Belge, and Rép. de Ph.)

Distilled Water of Copaiiba.—Dr. Edward Langlebert calls attention to this new distilled water, which he has employed about a year in urethral blennorrhagia.

Every physician knows that copaiba taken in the stomach acts locally after passing the kidneys, by aid of the urine, and this action has been attributed to a certain modification which it undergoes by the *vital chemistry* of the economy. The author views it as a case of distillation in which the urine becomes the aqueous solvent of the oil of copaiba.

It is this idea which suggested to him the employment of the Distilled Water of Copaiiba as a vehicle for urethral injections. The following are some of the injections which he has most frequently prescribed :

Distilled water of copaiba, three fluid ounces.

Sulphate of zinc, six grains.

Tincture of catechu, fifteen minimis.

Mix.

Distilled water of copaiba, three fluid ounces.

Sulphate of zinc, four and a half grains.

Lapis divinus, one and a half grains.

Mix.

Distilled water of copaiba, three fluid ounces.

Sulphate of zinc, six grains.

Levigated oxide of zinc, a drachm.

Mix.

Distilled water of copaiba, three fluid ounces.

Tannic acid or catechu, fifteen grains.

Mix.

Numerous experiments have convinced the author that these

injections are superior to similar preparations in which distilled water or rose water are used in lieu of the copaiba water.

Copaiba water is prepared by simply distilling water along with copaiba, and separating the supernatent volatile oil. A metallic still is to be preferred owing to the bumping that occurs in a glass retort.

Administered internally, its effects are like those of copaiba, but milder. It has been prescribed in quantities of four to six ounces per diem, with a few drops of cherry laurel water to cover its taste. It is taken with less repugnance and has never caused pain in the kidneys, frequently produced by ordinary copaiba.
—(Gazette des Hôpitaux, and Rép. de Pharm.)

On the relative value of Extracts from different parts of plants.
—M. Hirtz, in studying the causes of variation in the therapeutic power of medicines, has made a series of comparative experiments on the medicinal power of the extracts of several narcotics, etc. To procure the extracts, he, in each instance, extracted the drug, reduced to powder by displacement with alcohol of 65 per cent. Evaporated the liquors to a soft extract, and treated this with alcohol of 80 per cent. The liquid thus obtained was then evaporated at 140° F. till a second extract was obtained. The following are the results, viz:

Extract of Aconite root	is to that of the leaves as	25 to 1
" Root of Belladonna	to that of the leaves as	5 to 1
" Seeds of Conium	to that of the leaves as	10 to 1
" Seeds of Digitalis	to that of the leaves as	10 to 1
" Seeds of Henbane	to that of the leaves as	10 to 1
" Seeds of Stramonium	to that of the leaves as	5 to 1

M. Hepp, Pharmacien of Strasburg, in some experiments on the Seeds of Conium and Digitalis, obtained results, which in his opinion, did not corroborate the views of Mr. Hirtz, rather showing less comparative power in the seed than is stated by the latter.—(Gaz. Med. de Strasb. and Rep. de Pharm.)

GLEANINGS—MISCELLANEOUS.

Prizes distributed by the French Academy, 1861. M. J. Nickles, (correspondent of Silliman's Journal,) says that prizes for discoveries in Chemistry, Zoology, Physiology and Surgery, have been issued this year. The astronomical prize was divided between the five observers who discovered planets in 1860, viz.: Luther, of Bilk, Goldsmith of Paris, Chacornac, of Paris, Ferguson, of Washington, D. C., and Foster and Lesser, of Berlin.

The Cuvierian triennial prize was awarded this year to Dr. Leon Dufour, of St. Sever, at the base of the Pyrenees, for his researches in entomological anatomy. He is over 80 years of age, and has prosecuted his labors for nearly half a century.

The Chemical Prize.—The first chemical prize of 3,500 francs, was awarded to Mr. Berthelot, "for his researches in chemistry relating to the production, by synthesis, of certain chemical compounds existing in living bodies." The second prize of 2,000 francs was given to Dessaaignes, "for the production of succinic, aspartic, aconitic, fumaric and racemic acids, by the transformation of sugar of gelatin."

Acclimatation of the Ostrich.—For a long time the possibility of acclimating the ostrich has been doubted, under the impression that, like the elephant, this giant of birds refused to permit its posterity to be enslaved. This is an error, as already in Algeria, at Florence and in Spain, the young of this bird have been successfully raised. It is not yet known whether the birds born in captivity are capable of reproducing. The subject of attempting their acclimatation is being considered by the Société d'Acclimatation.—(Silliman's, July, 1861.)

Tough Lunar Caustic Points.—The editor of the "Chemist and Druggist," describes under this name what purports to be lunar caustic with about two per cent. of some adhesive material which renders it so tough as to be readily pointed, like a slate pencil. The name of the added substance is not mentioned, but it is said not to interfere with the action of the caustic. Each point about an inch long is neatly conical, and is enclosed in a glass tube. Dr. E. R. Squibb, manufactures conical pieces of lunar caustic, made tough by chloride of iron.

The Works of Lavoisier.—M. Dumas has undertaken to edit the works of Lavoisier, under the auspices of the government. Among the papers of Lavoisier obtained from M. Arago, Dumas has recently discovered an unpublished memoir, which proves that the author had many ideas in organic chemistry which have subsequently been discovered and worked out by Liebig and others. M. Dumas remarks, “If it be asked what were the ideas and opinions of Lavoisier, in regard to questions in organic chemistry, we must reply:—

1st. “He had discovered the process which seems to make all organic analyses, viz.: Their combustion by oxygen.

2d. “That he had learned also, as his laboratory records show, that instead of burning them in oxygen gas, he was able to burn them by means of metallic oxides, and instead of measuring the resulting carbonic acid gas, he had the means of weighing it after having absorbed it in two successive flasks of liquid potassa.

3d. “That he believed the bodies belonging to organic chemistry ought to be considered as the oxides or acids of compound radicals.

4th. “Lastly, that he understood the principal characteristics which distinguish the life of animals from that of plants; the character which pertains to each of the two organic kingdoms in the equilibrium of the forces of life; the part also which mineral matter serves in organic nature, combustion, and generally all which relates to its reduction.”—(Silliman’s Journal, July, 1861.)

Ricinate of Magnesia.—Under the head of *Notes and Queries*, in the Druggists’ Circular for August, we find the following notice of this salt of which, however, the writer knows nothing in regard to its therapeutical value.

“It is prepared by saponifying 35 parts of castor oil with the caustic lye prepared from 25 parts of sal-sodæ, diluting the soap with water so as to form an even emulsion, and then precipitating the magnesian soap by the addition of a solution of 24 parts of epsom salts, and six of common salt. The ricinate is washed with water, dried in the water bath, and kept powdered.” We should suppose that this salt would be decidedly cathartic, but have no knowledge of its having been used.

ON BETACINCHONIA, A NEW ALKALOID FROM CHINOIDINE.

BY WILLMAR SCHWABE.

In the laboratory of Mr. Eder, Pharmacist of Dresden, the author had occasion to purify commercial chinoidine, and then observed a new alkaloid, of which a number of salts were prepared and carefully examined. The elementary analyses were performed under the supervision of Professor Stein, and the crystals analyzed by Professor Lösche. The behaviour to solvents and the crystalline forms of the alkaloid and its salts, as prepared in different ways, exclude the idea of its being a mixture of two or more cinchona-alkaloids already known.

The chinoidine did not yield a clear solution with alcohol and diluted acids. The solution in dilute sulphuric acid was diluted with water and allowed to settle; the clear filtrate was precipitated with ammonia; the whitish, rapidly darkening precipitate was washed with cold and hot water, and carefully dried until brittle. This purified chinoidine showed a conchoidal fracture, became sticky in water, and dissolved clear in acids, but was not entirely soluble in alcohol. Its hot alcoholic solution was diluted with alcohol and allowed to rest. In a few days the clear solution was distilled, when the purified chinoidine, now perfectly soluble in alcohol and water, remained behind. It was, however, not a homogeneous uncrystallizable, but rather a gummy mass; and the surface of the sticks into which it had been rolled, contained a thin crystalline crust, which, after its removal and careful washing with alcohol to free it from chinoidine, was a white substance identical with the new alkaloid.

The difficultly-soluble sediment from the alcoholic solution as above is in "Geiger's Pharmacie, ii., by Liebig," stated to be impure cinchonia. It had, from adhering chinoidine, a black-brown color and resinous appearance. After solution in a diluted acid, the filtrate was precipitated with ammonia, and the precipitate, after washing with cold and hot water and drying, was triturated with alcohol of .845 and diluted with more alcohol. Next day the brown tincture was decanted and the residue washed with some alcohol, which was displaced with water. It now had a much lighter color, was again dissolved in dilute

sulphuric acid, the solution heated, and a hot solution of carbonate of soda added until a crystalline film formed, when, on cooling slowly, well-formed but slightly-colored crystals of the sulphate were separated, which, after repeated washing and crystallization, were pure. By dissolving them in acidulated water, precipitating with ammonia, washing, drying and redissolving the precipitate in boiling alcohol, the pure alkaloid crystallized on spontaneous evaporation. Or the impure sulphate may be dissolved in acidulated water, precipitated by ammonia, the precipitate washed with water and then with alcohol until the latter remains colorless, then dissolved in boiling alcohol, treated with charcoal, and allowed to crystallize. Quinia, if present, would have been removed by washing with alcohol, and cinchonia remained in the mother-liquor of the sulphate.

Properties.—Betacinchonia crystallizes on the spontaneous evaporation of a saturated alcoholic solution in quadrangular prisms three or four lines in length, the planes being joined at right angles; the ends are formed by planes at right angles with the prismatic axis, or by two planes, being at an angle of 119° with each other, of 120.5° with one pair and at right angle with the other pair of prismatic planes. The crystals of betacinchonia and some of its salts resemble in shape those of sulphate of brucia and lactate of zinc, the two end planes being in the former at 100° , in the latter at 147.5° .

Elementary analysis gave the following results:—

	Analysis.			Average.	Calculation.*	
C	77.146	77.672	77.043	77.285	77.922	$C_{40} = 240$
H	7.978	7.822	7.795	7.865	7.792	$H_{24} = 24$
N	9.102	9.075		9.088	9.091	$N_2 = 28$
O				5.760	5.195	$O_2 = 16$

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The alkaloid is obtained as a white, pearly crystalline mass,

* The author writes the formula $C_{20} H_{12} NO$, by which all the following salts must be viewed as basic. In conformity with the researches of Strecker and others on the various cinchona alkaloids, I thought best to double it, thus making all the author's basic salts neutral. This is in conformity with the view of the constitution of these alkaloids adopted in the United States. M.

if a concentrated alcoholic solution is diluted with water, and white, crummy and radiating crystalline on precipitating a salt by a base. Precipitated or crystallized, it is anhydrous, fuses at 150° C. (302 F.) to a colorless oily liquid, assuming a crystalline structure on cooling, decomposes at a higher temperature, and burns with a sooty flame. It is insoluble in cold water, scarcely soluble in hot water, soluble in 173 parts cold and 43 boiling alcohol, in 378 parts ether and 268 parts chloroform, and rather readily in volatile and fatty oils. Its alcoholic solution deviates polarized light to the right.

Potassa, soda, ammonia and their carbonates produce in the solution of its salts a white crummy precipitate, somewhat soluble in excess. Acidulated with tartaric acid, it is not precipitated by bicarbonate of soda.

The following exhibits the behaviour of its salts to reagents:—

Terchloride of gold, a sulphur-yellow precipitate.

Bichloride of mercury, a white precipitate, becoming resinous.

Bichloride of platinum in concentrated aqueous and in alcoholic solutions, an orange-yellow deposit.

Iodide of potassium in concentrated solution, white crystalline soluble in water.

Tincture of iodine and iodine water, crummy rust or red-brown, soluble in excess, in alcohol and ether.

Tincture of bromine, a yolk-yellow precipitate, consisting of microscopic globules.

Bromine water, no effect.

Picric and phospho-molybdic acid yellow pulverulent.

Tannic acid, yellowish white.

Permanganate of potassa is decolorized.

Concentrated sulphuric and nitric acids yield a clear solution, decomposed on heating.

Mixed with chlorine water, and afterwards with ammonia, the solution remains yellow.

Ferridcyanide of potassium produces in the solution of the sulphate a rose-red color, disappearing on the addition of sulphuric acid with the formation of a yellow precipitate, becoming crystalline.

Ferrocyanide of potassium, and afterwards chlorine water,

added to the sulphate, produce a red color turning green on the addition of ammonia.

Cyanide of potassium yields instantly a white precipitate.

Salts.—Betacinchonia forms with acids only neutral salts, which crystallize even from an acid solution.

Hydrochlorate of betacinchonia $C_{40} H_{24} N_2 O_2$, $HCl + 4HO$ crystallizes in small four-sided prisms, dissolves in 22 parts cold and 3.2 parts hot water, in 1 part cold and one-fifth part hot alcohol, and in 550 parts ether. Its double salt with bichloride of mercury = $C_{40} H_{24} N_2 O_2$, $HCl + Hg Cl_2$ is white and resinous. The double salt with bichloride of platinum = $C_{40} H_{24} N_2 O_2$, $2HCl + 2Pt Cl_2$ crystallizes in anhydrous hexagonal prisms, pretty soluble in water, nearly insoluble in alcohol.

Hydriodate of betacinchonia $C_{40} H_{24} N_2 O_2$, $HI + aq.$ small soluble crystals.

Hydrocyanate $C_{40} H_{24} N_2 O_2$, HCy amorphous, insoluble in water and alkalies.

Hydrosulphocyanate: long thin crystals, efflorescing in dry air.

Sulphate $C_{40} H_{24} N_2 O_2$, $SO_3 + 2HO$: four-sided prisms, soluble in 75 parts cold and 14 hot water, in 13.6 parts cold and $1\frac{1}{2}$ parts hot 80 per cent. alcohol, and insoluble in 98 per cent. alcohol and ether. The solution, much diluted, is very refractive.

Iodosulphate is analogous to herapathite.

Nitrate $C_{40} H_{24} N_2 O_2$, $NO_3 + HO$ separates on spontaneous evaporation in oily drops, forming in four or six weeks colorless crystals, 1 to $1\frac{1}{2}$ inches in length; they are not efflorescent, and dissolve in water and alcohol.

Phosphate: well formed efflorescent crystals, readily soluble in alcohol, less in water.

Acetate: four-sided prisms, easily soluble in water and alcohol, and not efflorescent.

Tartrate: transparent crystals, becoming opaque, very soluble in water.

Oxalate is obtained like the nitrate, and crystallizes in very efflorescent radiating bundles.

The crystalline form, solubility and other properties of the new alkaloid and many of its salts are in the original compared

with the corresponding compounds of quinia, Von Heyningen's β quinia, cinchonia and Erdman's huanokia.—(*Arch. d. Pharm.* cliii. 273—291.)

J. M. M.

ON THE PREPARATION OF CHLOROFORM.

By MICHAEL PETTENKOFER.

Frequently preparing chloroform, the author noticed the great difference in the yield when operating with the same quantities of chloride of lime and alcohol, and apparently by the same process. Changing the process, using a chloride of lime of which the active chlorine had been estimated, and dividing the chloride of lime carefully in the liquid, did not produce an even result; it was observed, however, that the yield was less in proportion to the time which the mixture had been allowed to stand previous to distillation.

If a clear solution of chloride of lime is mixed with alcohol, the solution turns but slightly turbid in a temperature of 8—10° R. (50—55° F.,) and assumes but a faint odor of chloroform. The turbidness is stronger, and increases in a shorter time if exposed to a temperature of 88 to 100° F. Heated to 150—167° F., the mixture, unless too dilute, becomes gelatinous and evolves gas-bubbles of evaporating chloroform. If now the mass is heated to 167 or 185° F., until destitute of the odor of chloroform, the gelatinous appearance is gone, and the liquid contains a white precipitate of carbonate of lime. Besides the odor of chloroform, that of chlorine becomes apparent in proportion to the rapidity with which the mixture is heated to boiling, and the quantity of the precipitate is proportionately diminished. The temperature most favorable for the formation of chloroform lies between 46 and 60° R., (185 and 167° F.) Below 112° F. the yield of chloroform is always decreased, and the more so the longer the mixture had remained at a lower temperature. If the mass is quickly heated to the temperature of boiling water, hypochlorous acid appears to be evolved, thus causing a loss of a compound requisite for the formation of chloroform.

On distilling chloroform in larger quantities, particularly on heating rapidly and continuing the heat after the formation of chloroform is in progress, a peculiar odor of chlorine is frequently observed, interfering with the respiration, and the product has then a more or less greenish color; its temperature rises spontaneously to 30—45° R. (100 to 134° F.,) and generates gas of an acrid chlorine odor. If thrown into water, the chloroform becomes colorless, and the wash-water contains hydrochloric acid. In the direct sunlight, such chloroform loses its coloration instantly with more or less elevation of temperature. The more of this chlorine-compound is contained in the chloroform, the smaller is the yield.

If the mixture has been heated sufficiently, the chemical reaction increases the heat to the boiling point of water, all the chloroform distils over, and it is merely necessary to return the supernatant alcoholic liquid to the still, to obtain the chloroform contained in it, by a moderate heat. Two pounds chlorinated lime were intimately mixed with two gallons water of 90° C., when the temperature fell to 80° C.; after adding four fluid-ounces of 90 per cent. alcohol, the temperature was 75, but rose without any external heat in fifteen minutes to 87°, in twenty minutes to 91°, in twenty-five minutes to 95°, in thirty-five minutes to 97°, and in forty-two minutes to 98° C., without rising any higher. The mixture boiled with little foaming nearly half an hour, the chloroform vapors being condensed in the long neck of the flask. In seventy minutes the temperature fell to 94°, and in one hundred and twenty minutes to 60° C.

A number of experiments were made at different temperatures with alike quantities of chloride of lime, alcohol and water. The alcohol had a spec. grav. = .834; the chloride of lime contained from 27 to 28 per cent. active chlorine. The distillation was carried on in a tubulated copper still of eight cubic feet capacity, with a flat tin head and tin condensing pipe, kept in water of 50° F. The supernatant stratum of the distillate was repeatedly returned into the still as long as chloroform was separated by distillation. The chloroform was agitated with water, removed by a separating funnel and weighed.

The experiments may be divided into four distinct groups.

In every instance the quantity of chlorinated lime was 32 lbs. (Bavarian,) of water 60 maass, and of alcohol $2\frac{1}{2}$ maass.*

GROUP I.—The chlorinated lime was triturated with cold water, the alcohol was added, the joints of the still luted, and heat applied. At the commencement of the distillation the fire was removed, but moderately applied again, when distillation ceased.

Exp. 1.—The fire burned rapidly; distillation began in 30 minutes; the chloroform was of an intense greenish-yellow color, and became hot, spontaneously evolving much gas and losing its color. Yield, 20 ounces, or 3.3 per cent. of the weight of chlorinated lime.

Exp. 2.—Beginning of distillation in 45 minutes; chloroform greenish-yellow, lighter than No. 1; in the direct sunlight its temperature rose to 138° F., with the evolution of gas. Yield, 30 oz. = 5 per ct.

Exp. 3.—Distillation commenced in 58 minutes; its first distillate was deep green yellow, afterwards colorless; the mixture grew warm without evolving gas. Yield, 32 oz. = 5.3 per ct.

GROUP II.—The water was heated, the fire removed, the chlorinated lime carefully stirred in, and after ascertaining the temperature, which was between 167 and 153.5 F., the alcohol was added and mixed. The heat rose gradually; distillation commenced after some time, and the chloroform came over first in drops, afterwards in larger quantities, then slower again; after it ceased, the supernatant stratum of the distillate was returned into the still, and heat applied as long as chloroform distilled over.

Exp. 4.—Temperature of the mixture, 162.5 F.; commencement of distillation in 20 minutes; the chloroform was faintly greenish-yellow, and became colorless with little rise of temperature. Yield, $38\frac{1}{2}$ oz. = 6.4 per cent.

Exp. 5.—The water and chlorinated lime were heated together to 167 F., and allowed to cool to 156 before the alcohol was

*A Bavarian maass, = 43 cubic inches, contains, at 17° C., $35\frac{1}{2}$ oz. distilled water; 60 maass water = 2130 oz.; $2\frac{1}{2}$ m. alcohol of .834 = 65.34 oz. 1 oz. Bavarian medicinal weight = 30 grammes: 1 lb. med. w. = 360 grms.: 1 lb. Bav. civil weight = 560 grms. = 18 oz. 16 scrup. medic. weight.

added. Distillation commenced in 14 minutes, and was ended in 75. The chloroform contained little chlorine, and decolorized in the sunlight, the temperature rising slightly. Yield, 40 oz. = 6.7 per ct.

Exp. 6.—Temperature of the mixture 153.°5; commencement of distillation in 20, end in 110 minutes; the chloroform contained very little chlorine, and became colorless without generating heat. Yield, 42 oz. = 7 per. ct.

GROUP III.—Operation as in II. The temperature of the mixture of chlorinated lime and water was between 167 and 180.°5 F.

Exp. 7.—Temperature 180.°5; distillation commenced in 7 minutes; the chloroform contained chlorine, and became colorless, evolving heat. Yield, 32 oz. = 5.3 per ct.

Exp. 8.—Temperature 171.°5; distillation began in 15 minutes; the chloroform contained chlorine, and decolorized in the sunlight, with evolution of heat. Yield, 34 oz. = 5.7 per cent.

Exp. 9.—Temperature 167°; distillation began in 22 minutes; the chloroform contained little chlorine, and lost its color in the sunlight, with little rise of temperature. Yield, 35½ oz. = 5.9 per ct.

GROUP IV.—Operation as before; temperature of the mixture between 135.5 and 117.°5 F.

Exp. 10.—Temperature 135.°5; commencement of distillation in 40 minutes; the chloroform was colorless and evolved no heat. Yield, 37 oz. = 6.2 per ct.

Exp. 11.—Temperature 122°; distillation commenced in 3 hours, and continued in drops for 2 hours, when a moderate fire was applied. Yield, 30½ oz. = 5.1 per ct.

Exp. 12.—Temperature 117.°5. A few drops commenced to come over after 3½ hours; within an hour a small quantity of colorless chloroform came over in drops; the distillation ceasing, heat had to be applied. Yield, 28½ oz. = 4.7 per ct.

These experiments show conclusively that with the materials of the same quality and quantity the temperature exerts an important influence upon the formation of chloroform. Between 135 and 167° F. the yield sinks scarcely below 6 per ct.; the largest amount was obtained by experiments 5 and 6, at 156

and 153°. Heated above 167°, the yield decreases as in Group III., and the chloroform contains more chlorine. At and below 122°, the yield likewise decreases, (Exps. 11 and 12,) but the chloroform is entirely free from chlorine or its acids, if a sufficient time has elapsed before artificial heat was applied.

The most variable quantity of chloroform is afforded if the ingredients are mixed at ordinary temperature, and the formation induced by heating afterwards. If the mixture is heated rapidly, and the temperature passes quickly above 167°, the amount of chloroform decreases; it contains much chlorine and evolves heat spontaneously; moreover, the mass is apt to pass over, and many troublesome precautionary measures are requisite to retain it in the still. If, on the other hand, the fire is removed after the temperature of between 135 and 167° is attained, the yield will be favorable. This circumstance explains the increased amount with a larger quantity of water in proportion to the chlorinated lime, as then the proper temperature may be accidentally more easily reached; but with the greatest care the yield is very variable.

By operating as directed for Group II. of the experiments, the chloroform distils spontaneously without danger for the mass to pass over, though the still may be far more than half filled. After the cessation of the distillation, the supernatant portion is returned and with a slight heat rectified; or it might perhaps be better to distil it by itself from a glass retort, or preserve it for the next operation.

Much of the result depends likewise on the shape and other conditions of the still. If made of a good conductor of heat, or being exposed to draughts of air, or supplied with a high head, the still will be refrigerated, and the contents require to be heated previously a few degrees higher, or the application of heat after the temperature has begun to fall. Larger quantities of material will of course less readily be cooled down.

The author used likewise three other vessels for preparing chloroform, from three to ten pounds of chlorinated lime. Employing a common demijohn set in straw, and cooling with a Liebig's condenser, he obtained from ten pounds of chlorinated lime 6 per cent. chloroform. A cask appears to be the most suitable still for chloroform, if connected with a good refriger-

rator; if some chloroform should be left behind, steam will carry it over. From a tin still, standing free in a high-pressure steam-apparatus, and a quantity of 3 lbs. chlorinated lime, no spontaneous distillation took place, until the head and upper part of the still were protected from rapid refrigeration by wrapping them in blankets.

Regarding the purification of chloroform, if a clean apparatus and alcohol free from fusel oil has been employed, it is but necessary to agitate it with a sufficient quantity of a solution of carbonate of soda, until the supernatant liquid has an alkaline reaction. The chloroform is separated, agitated with little water, and set aside in a cool place until both strata have become perfectly clear; the water is again removed by means of a separating funnel, and the chloroform filtered through a double filter, to free it entirely from water, while the funnel is kept covered with a glass plate. The rapidly-filtering chloroform is clear, possesses a pure odor, and is soluble in fat oils in all proportions.

If alcohol containing fusel oil—and the best commercial rectified spirit is not absolutely free from it—has been operated with, the chloroform, after having been shaken with carbonate of soda, is to be rectified by itself in the water-bath at as low a temperature as possible, to free it from the ethereal compound of a peculiar fruity odor, which, however, is not entirely removed by repeated rectification. If now coming over with water, the chloroform need but be filtered at a low temperature. Thus purified, it imparts to sulphuric acid but a very faint coloration after being agitated with it.

Chloroform is obtained of a very pure odor, if after freeing it from acid it is left in contact with freshly-calcedined powdered animal charcoal, with repeated agitation, and after several days filtered or rectified in the water-bath.—*Buchner's N. Repert.* x. 103—115.

J. M. M.

ON SOME SPECIES OF HELLEBORUS.

By PROF. SCHROFF.

The ancients knew only *Helleborus niger* and *albus*,—the *Veratrum nigrum* and *album* of the Romans. Belonius first

recognized (1546) *Helleborus niger* and *Veratrum nigrum* as different plants, and Tournefort declares the former to be the plant of the ancients. It is the *Helleborus officinalis*, Sibth., *s. orientalis*, Lam. ; probably also *H. antiquorum*, A. Braun., (*H. olympus* of others,) but not *H. niger*, Linn., which seems to be a rather hypothetical plant.

A different species is *Helleborus ponticus*, A. Braun., *s. orientalis*, Desf., growing in the neighborhood of Trapezunt. The plant resembles *Helleb. viridis* in appearance, but is of very little efficacy. Neither half a drachm of the fresh root, cut into small pieces, nor one drachm of the same dried and powdered, has any material effect on rabbits. One drachm of an ethereal extract produces emaciation with increased secretion of urine, sometimes terminating in death. The alcoholic extract kills rabbits under convulsions, if one drachm is taken ; ten grains of it show still a marked effect.

Helleborus purpurascens, Waldst. Kit.—another species—is used by the Hungarians in the same manner as *Helleborus viridis* in Austria, especially in veterinary practice. The Romans call it *Spang* ; it may be the *Cossiligo* of Columella. The fresh root is very much like that of *Helleb. viridis* in external appearance as well as internal organization. One drachm of it in powder, or twenty grains of the alcoholic extract, are sufficient to kill a rabbit.

Adopting the intensity of the effects produced as a basis of classification, we have to arrange the different species in this order: *Helleborus niger*, *ponticus*, *purpurascens*, *fætidus*, *viridis*, *orientalis*.—*Zeitschr. d. Gesellsch. d. Aerzte zu Wien.*

THE ADULTERATIONS OF MUSK AND THE METHODS OF EXAMINING THE SAME.

BY PROF. W. BERNATZIK.

Musk in substance is examined by crushing, pulverizing, microscopical inspection and microchemical investigation. The more important agents used in chemical examination are: rectified oil of turpentine, glycerin, potash-lye, and nitric acid containing some nitrous acid.

A very small amount of musk, mixed with a few drops of oil of turpentine or glycerin, and heated for a short time, appears, when cold again, under the microscope, in the form of cloddy globules of a yellow (where accumulated, brownish) color, and is thus readily distinguished from powdered coal and other admixtures. Where the character of one or the other globule remains doubtful, a fresh portion of musk is heated with a few drops of a solution of potash. The dissolved light-brown substance presents under the microscope innumerable fat-globules of different size. Ammonia has a similar effect.

Nitric acid, mixed with musk and slightly heated, produces vapors, presenting the smell of musk and nitrous acid, and changes the musk to a light brown, soft, resinous mass, which turns into a brownish cloudy fluid under the addition of a little more acid. Appearance under the microscope same as before described. The addition of water produces a copious yellowish-red sediment, which is soluble in solution of potash.

Concentrated sulphuric, muriatic, acetic acids show no influence on musk in common temperature. Aided by heat, sulphuric acid produces a dirty brown frothy solution, which after a while turns turbid and blackish. The other acids named, induce even with heat, no great alteration, beyond vapors corresponding to the acid, swelling of the globules, and coloration of the acid, without perceptible solution. Similar is the action of iodide of potassium combined with iodine.

If admixtures are discovered, they should be isolated by treating the mass with diluent agents, especially cold or hot water, or by cautious flowing.

Musk that has been subjected to extraction (for perfumery purposes, etc.) is frequently used to adulterate the officinal article. This can be detected by dissolving the suspicious mass in different fluids. Hot water dissolves only fifty-five per cent. of well-dried musk. A solution of it in twenty parts of water is red-brown, somewhat thick, not easily filtered, of acid reaction, not disturbed by ether or alcohol. All mineral and organic acids produce a dirty brown sediment, leaving the solution of a yellowish-red color. A similar effect is shown by acetate of lead, the oxides of iron, muriate of tin, the nitrates of mercury and silver, sulphate of copper, chloride of platinum, sulphate of

alumina, common alum and muriate of baryta. Chloride of mercury does not disturb the fluid; potassa, soda, and the alkaline carbonates impart to it a darker color; ammonia and lime water cause a slight disturbance; tannic acid and many organic, especially animal, substances do that only when added in excess. Absolute alcohol dissolves musk not to the same extent as water, repeated extraction leaving 75 per cent. of a gray-colored, slightly brownish mass. The solution is of a yellowish-white and somewhat red color, with a fine white flaky sediment. Addition of water only affects it, when resinous or fatty substances are present. Diluted alcohol dissolves musk the more readily the more water it contains. Ether and chloroform possess hardly any dissolving power.

Adulterations with dried blood, animal coal, vegetable extracts, adipose substances, resins, asphaltum, stone coal, coffee sediments, etc., are recognized by the difference in the changes produced under the influence of other agents; desiccated blood, for instance, being not very soluble in water, etc.

It may be necessary to reduce the suspected substance to ashes. Burning musk smells like burned extract of urine. It leaves about five per cent. of grayish-white, here and there yellowish or pale red ashes, containing potash, lime, magnesia, iron, carbonic, phosphoric and sulphuric acids, chlorine, traces of ferrocyanate of potassa and sulphuret of ammonium. Blood leaves 8.5 per cent. of red brown ashes; other admixtures only a very small percentage.

Musk sold without pouches seems to be extensively mixed with inferior sorts—an adulteration which cannot be detected. Probably the mass remaining after extraction by alcohol is frequently used for the same purpose. Pouches that have been punctured and macerated in alcohol, are recognized by their shrivelled, knotty appearance. The residue left in the preparation of the officinal tinctures is possibly also sold for pure musk. Moistening is frequently resorted to, for the purposes of increasing the weight. Every specimen which loses much in weight by drying, should be rejected, for genuine musk, even if kept as dry as possible, has rather a tendency to increase somewhat in weight.

Pieces of lead or iron, small shot, stones, portions of tendons,

leather, paper and artificial musk are frequently added to, or substituted for a part of the contents of the pouches. Sutures and other occlusions appear after moistening the pouches by wrapping them in wet blotting paper.

Artificial pouches—Wampo-musk—never show the proper anatomical conditions: the genital opening, penis, etc. are wanting, and the heterogenous composing parts are readily discernible.—*Zeitschr. d. Gesellsch. d. Aerzte zu Wien.*

ON THE CONSTITUTION OF SCAMMONY RESIN.

By H. SPIRGATIS.

After referring to the investigations of Johnston (Philos. Trans. 1839, ii. 342), his own (see Am. Journ. Ph. xxvi. 446,) and Keller's (Am. Journ. Ph. xxx. 256), the author describes the three samples of scammony, from which he obtained the resin for his researches; they yielded 71, 65 and 73 per cent. of pure resin, which was prepared by diluting the alcoholic tincture with water, treating with animal charcoal, and distilling off the alcohol; the residue is then treated for several weeks with hot water, which removes an odorous volatile acid and an inodorous compound of the same.

Thus prepared, the resin is amorphous, colorless and transparent, and yields a white powder. If containing water, it remains soft below 100° C.; dried at this temperature, it softens at about 123°, fuses near 150° C. (302° F.) to a clear colorless liquid, and decomposes at a higher heat. It dissolves in alcohol in all proportions, and is reprecipitated in flocks by water. It is likewise soluble in ether, benzole, chloroform, and more difficult in petroleum and oil of turpentine. The solutions in potassa, soda, ammonia and baryta yield no precipitate; impure resin yields with these bases a yellow solution, turning deep reddish yellow, and separating greenish grey floccules on heating. The resin dissolves also in boiling alkaline carbonates, and in acetic acid; the solution in sulphuric acid is of an amaranthine red, turning brown and black, splitting the compound which is likewise occasioned by hydrochloric and nitric acids.

The alcoholic tincture is not affected by little nitric acid,

acetate of copper, acetate and subacetate of lead, nitrate of silver and sesquichloride of iron (difference from guaiacum.) An adulteration with the resin of jalap (*Ipomoea jalapa*, Nutt.) is detected by the almost insolubility of the latter in ether. As an average from 8 analyses, the author obtained C56.50, H7.97, O35.58, agreeing well with Keller's results, but more so with Mayer's analyses of Jalapin, the resin from *Convolvulus orizabensis*, Pell. The formula $C_{68}H_{56}O_{32}$ requires 56.66, 7.77 and 35.57 per cent.

The resin was dissolved in caustic baryta, the latter precipitated by sulphuric acid, an excess of it removed by hydrated oxide of lead, and the lead thrown down by sulphuretted hydrogen. The colorless acid liquid possesses a peculiar odor, which is entirely removed by distilling it to a syrupy residue, after renewing the water several times. The distillate was turbid, of a strong acid reaction, and yielded, after being evaporated with carbonate of soda, on distilling with phosphoric acid, a small quantity of a volatile acid, resembling butyric and valerianic acid in odor. This impurity of the resin was not further examined. From the residue in the retort a crystalline mass is separated, apparently identical with one of the products of decomposition by acids. Merely traces of this crystalline principle and volatile acid are obtained from pure resin.

The syrupy residue is treated, when necessary, with animal charcoal, and evaporated to dryness, when an amorphous yellowish mass remains, resembling the original resin. It is very deliquescent, inodorous, of an acrid, acidulous, afterwards bitterish taste, free from sugar, and soluble in alcohol, water, and less in ether. This *scammonic acid* gave from 4 analyses C54.59, H8.16, O37.25, corresponding with Mayer's jalapic acid, for which he calculated $C_{68}H_{56}O_{32}, 3HO$. Fused with an excess of baryta, or dissolved in baryta water, and the excess removed by carbonic acid, the amorphous mass obtained has the composition $3BaO, C_{68}H_{56}O_{32}$.

If scammonic acid is heated with dilute sulphuric acid, or if the hot solution of the resin in baryta water is mixed with an excess of strong hydrochloric acid, oily drops were separated, which, after congealing, were purified by recrystallization from ether or diluted alcohol. The filtrate from this crystalline body

contains sugar (glucose). Ether left white granular crystals ; alcohol yielded microscopic thin needles. They are inodorous, of an acid reaction, acrid taste, soluble in alcohol and ether, and gave from 5 analyses C70.95, H11.51, O17.54 = $C_{32}H_{29}O_6$. This *scammonolic acid* has the same composition and properties as Mayer's jalapinolic acid, which was obtained by this chemist only by decomposing jalapic acid with fusing alkalies ; by acids he obtained jalapinol, which on combining with alkalies, lost 1 equiv. H₂O, and became this acid.

Scammonolate of soda NaO₂C₃₂H₂₉O₅ of potassa and ammonia crystallize in white needles and are soluble in water and alcohol. The results of 7 analyses of scammonolate of baryta and 2 of the lead salt agree with Mayer's jalapinolates. Scammonolate of oxide of ethyle is obtained by saturating the boiling alcoholic solution of the acid with hydrochloric acid gas, decomposing with carbonate of soda, and purifying from alcohol ; prepared in the same manner from the resin, the liquid contains sugar. The ether crystallizes in flat tables, fuses at 32.°5 C., and shows from 3 analyses the composition C72.39, H11.65, O15.96 = $C_4H_5O_2C_{32}H_{29}O_5$.

Scammonolic acid treated with nitric acid of 1.30 spec. grav. yields crystals, which from their shape, solubility, behaviour to reagents, and from one elementary analysis, are most probably identical with Mayer's ipomic acid ; the mother liquor contains oxalic acid. Want of material prevented further researches.

The author would consider the resin of scammony identical with that of Conv. orizabensis, but for his obtaining scammonolic acid from resin of scammony, on treating it with acids, while Mayer's jalapin yielded by a similar treatment, first jalapinol, and jalapinolic acid only after employing fusing alkalies.

The author concludes with a long and searching criticism of Keller's two papers on the same subject.—(*Ann. der Chem. und Ph.* xl. 289—323.)

J. M. M.

ALCOHOL—ITS ACTION AND USES.

The question of the action of alcohol on the system, and its value as a dietetic and therapeutic agent, is now attracting much attention both amongst the members of our profession and the

scientific world at large. No doubt can be entertained of the importance of a consideration of the subject—a consideration, however, into which our limits will not allow us fully to enter. If there were one cherished view which we thought chemistry had taught us, it was surely that alcohol was oxidised in the system, and thus made subservient, if not to the formation of some of the tissues of the body, at any rate to the maintenance of animal heat. However indisposed physiologists may have been of late years to give in their adhesion to the theories of Liebig as to the division of alimentary materials, we think that most have been, and probably many will still be, disposed to consider the substance we are speaking of in the light of a heat-producing agent. Our opinions on this point have, however, been somewhat rudely assailed, and the position which alcohol has occupied as a dietetic article is threatened with imminent danger. As from the chemists we received the theory of its combustible nature, so from chemical research and experiment now comes the opposite doctrine of its entire elimination, unchanged, from the body.

Considering the vast amount of alcohol which is daily consumed, whether as a general article of diet, or in the treatment of disease, it becomes a matter of essential importance that correct principles should be laid down with reference to its *modus operandi*, and the manner in which it is disposed of in the system. We cordially hail, therefore, the appearance of the work of Messrs. Lallemand, Perrin, and Duroy (*Du Role de l'Alcohol et des Anesthésiques dans l'Organisme*, Paris, 1860,) which gives us the results of the most recent experiments and researches on the subject. A careful perusal of this work has convinced us that some of our views of the dietetic value of alcohol require modification; but we cannot, on that account, allow the evidence which is brought forward, and which does not appear to us conclusive on the point, to make us discard altogether the substance of which we are speaking from our list of alimentary materials.

If we were briefly to sum up the facts which the researches of the above authors seem to have established, they would be these:—That, after any fluid containing alcohol is taken, the latter becomes eliminated, unchanged, by the various secreting organs.

—the skin—the liver—the kidneys—the lungs; and not only this, but that it is deposited in all the tissues, and can be extracted alike from the substance of the brain, the liver, the muscles, and the cellular tissue, as well as from the blood. It is right to observe that, even when small quantities of alcohol were taken, traces of it could be found in the excretions; thus proving that it is not simply when the substance is taken in excess that it becomes eliminated without change.

From the results of their experiments MM. Lallemand, Perrin, and Duroy think they are justified in concluding that all the alcohol ingested, with the exception of a small quantity which they and other experimenters have found converted into acetic acid in the stomach, is eliminated from the body, without undergoing any change whatever; and that in this respect it resembles in its action the various anaesthetic agents, such as chloroform, &c. From these conclusions necessarily follows the inference that alcohol cannot be considered in the light of an alimentary substance.

We believe Dr. Percy was the first to show that, after poisoning by alcohol, this substance could be found in the ventricles of the brain, as well as in the brain-matter itself; and we are all aware of the fact, that fumes of alcohol are exhaled from the lungs even when only a small quantity of the fluid has been swallowed. The chief points that are new, which have been brought to light by the investigations of our authors, are the elimination of the alcohol unchanged through the medium of the skin, the kidneys, &c.; and its deposit in the tissues generally. It is true that Klenke had demonstrated the presence of alcohol in the urine and bile; but with this exception, physiologists had advanced the opinion that the secreting organs did not eliminate the substance.

There cannot be a doubt of the great importance and value of the researches of M. Lallemand and his coadjutors; for supposing their results to be trustworthy—and we believe them to be so—they establish beyond a doubt the fact that, at any rate, a portion of all ingested alcohol may go the round of the circulation, traverse the various capillaries of the body, and without undergoing any oxidation whatever, be ejected from the system in the different secretions. This portion, therefore,

cannot be concerned in building up the fabric of the body, nor can it by its combustion contribute to the maintenance of animal heat. This is surely an important conclusion to have arrived at. The weak point, however, in the arguments adduced against the value of alcohol as a respiratory food, is the small quantity of it which the experimenters have been able to extract from the various secretions. It is possible that, by more delicate modes of investigation, and by the use of more subtle tests, a much larger proportion may be detected; but we are inclined to think that, until some such result is obtained, physiologists will not be disposed to abandon their views as to the oxidizable nature of the substance.—*Lon. Pharm. Journ.* May, 1861, from *Br. Med. Journ.*

ON THE COMMERCIAL PURIFICATION OF BITTER ALMOND OIL,

BY JOHN S. BLOCKEY.

The poisonous nature of this substance in its crude state warrants the conclusion that some method of perfectly freeing it from prussic acid or combined cyanogen should be universally adopted, either in its first formation from the almonds, or in the subsequent rectification.

Whether even then it is quite harmless is, I think, yet to be proved, and the experiments detailed below tend to show that it possesses very powerful properties, although not so poisonous as the crude oil. Possibly, like many essential oils, it may be found available in medicine. Gerhardt states that the oxide of mercury will free the crude oil from cyanogen, but I have repeatedly tried the efficacy of this agent both alone and with water at various temperatures and during various durations without any success. I also assured myself that the H₂Cy is not in a free state, for no effervescence takes place on the addition of NaO Co₂ either in solution or otherwise. I next tried caustic potassa, but the only effect was to produce a quantity of benzoate of potassa equivalent to the amount of alkali employed. The hydrated oxide of mercury appears to have no action. I concluded, therefore, that some plan must be adopted to free the cyanogen from the oil, which would possess sufficient affinity

for that purpose, and at the same time not exert any action on the free hydride of benzoyle. After many attempts, one of which consisted in trying chloride of iron and lime, I finally adopted the following plan. I had found that on mixing a small quantity of oxide of mercury and water, and agitating the oil, and then adding a little caustic potassa and filtering, that the oil passed through clear and colorless and entirely free from cyanogen ; but I found that the purified oil dissolves appreciable quantities of the mercury, and if chemically pure hydride of benzole be digested on dry oxide of mercury and filtered, it will be found to dissolve it to a certain extent. I therefore procured a wrought iron still, having a very long neck, around which a stream of cold water was allowed to pass, so as to cool the vapor sufficiently in order not to crack the glass tubes of the condenser. I found that an ordinary metal worm was speedily dissolved by the distillation of mercury. The pure oil does not dissolve metallic mercury as it does its oxide. In the retort of the still I placed a quantity of crude oil, a small quantity of solution of caustic potassa, and lastly, the quantity of oxide necessary. The actual weight of the latter has to be varied. Some kinds of oil contain more cyanogen than others, and the requisite quantity of oxide was determined on a small quantity and filtration. The quantity of potassa required is, strange to say, very small in all cases, and I always found that, although distillation with HgO and water alone never succeeds in freeing the cyanogen, a small quantity of caustic added produces perfect separation. More alkali must not be added than necessary, or the high heat of the distillation will cause the formation of benzoate ; and if the operation be effected by means of a current of steam, the water dissolves large quantities of the oil. For this reason as little water must be added as will suffice to dissolve the caustic alkali, and by careful management of the heat nearly all the water comes over before any oil distils.

Towards the close of the operation, large quantities of a thick smoke suddenly pour over, smelling strongly of some of the acryle compounds. I have been unable to determine at present to what these fumes are due, but I have noticed that as the oil distils it gets darker in color, and at last a tarry matter containing nitrogen comes over, and I have sometimes, by very cautious

management, been able to obtain all the pure oil some seconds before the sudden evolution of fumes. The oil then requires filtration from small globules of mercury, and one-tenth of rectified alcohol to be added,—the use of spirit is to prevent the gradual decomposition of the pure oil, as it becomes turbid and speedily deposits crystals, especially if not perfectly secured from the air. I have never yet had an opportunity of determining the composition of this substance, although I have kept a quantity for some years till an occasion should offer. It sublimes, leaving carbonaceous residue, melts at a low heat, and solidifies again to a crystalline mass.

I intended pursuing this investigation further, but other matters have since occupied me. I should have liked to determine the composition of the tarry residue in the retort, of the acrid vapors, and of these crystals; also to ascertain whether the oil dissolves other oxides, and to what extent. As I cannot foresee any opportunity for so doing for some little time, I am compelled to postpone a paper on these subjects. Meantime, I send the result of some experiments on the effects of the pure and impure oil on the living animal.

Fifteen fluid minims of crude oil administered to a full-grown cat, produced all the poisoning symptoms of prussic acid: violent, spasmodic contractions, &c.; the slightest touch producing a contraction in the limb touched; in twenty-four hours the cat was alive and apparently well.

Twice the above dose killed another cat almost instantly.

Thirty fluidminims of pure oil seemed to act powerfully at first as a stimulant, terminating, after a minute or two, in loss of all power of motion, gradually diminishing, and the animal eventually got well.

The above doses were all administered in olive oil. Thirty fluid minims of pure oil administered alone killed a cat in some hours.

Ninety minims of pure oil alone killed a cat instantly.

Further experiments suggested themselves, but the destruction of life is not a pleasing subject for experiment, and the above are sufficient to show the poisonous nature even of pure oil, and that this effect is greatly modified by the presence of olive oil.—*Chem. News London, June 2d, 1861.*

NOTE ON BLOOD-STAINS.

By M. GUIBOURT.

One of the problems of chemical jurisprudence most frequently presenting itself is that of determining the nature of supposed spots of blood, and one of the most usual methods consists in treating the spots in a manner accurately described in special works with a small quantity of distilled water. This water, in the case supposed, dissolves the coloring matter of the blood, leaving the fibrin on the spot. The liquid, which is red and transparent, loses its color by boiling, and forms a gray coagulum, which a small quantity of caustic potash will re-dissolve. The liquid, again become transparent, appears either reddish or green according to the manner of looking at it.

Let us suppose an operation carried on in a straight glass tube closed at one end. The alkaline liquid prepared as is about to be ascribed, will appear green by transmitted light; that is to say, when the tube is placed between the eye and the daylight. If, on the contrary, the experimenter stands between the tube and the light, the liquid appears reddish, the color being perceived from the same side as the reflected rays.

M. Picquot, junior, a pharmacist Bar-le-Duc, when called upon to decide whether the spots found on some planks in the house of a suspected murderer were spots of blood, after having obtained the preceding results, was much puzzled by reading in M. Devergie's "Médecine Légale" that the sanguineo-alkaline liquid is green seen by reflection and rose colored by refraction (vol. iii. p. 822). M. Gaultier, of Claubry, is even more positive. In his "Chimie Légale," p. 7, he says:—"The liquid takes then a green tint seen by reflection and rose by refraction. * * * * The green coloration by reflection, rose or reddish by refraction, is a certain proof of the presence of blood." M. Picquot finds here a confusion of words, and I quite agree with him. First, the green color seen by transmitted light on placing the tube between the eye and the light is evidently not a reflected color. Again, this same green color is refracted, since the luminous rays cannot traverse the liquid without undergoing refraction on entering the liquid and again on emerging from it.

Only the reddish color seen from the side whence the light proceeds simultaneously with the reflected rays can be said

to be seen by reflected light: but it must be remarked that it is not reflected directly by the exterior surface of the liquid. It proceeds from all the internal points, undergoes a multitude of internal reflections, and is finally refracted on its exit before reaching the eye.

For the sake of accuracy, it is necessary to substitute in place of the characteristic phrase of MM. Devergie and Gaultier, of Claubry, the following proposition:—The sanguineous liquid (obtained after re-dissolving in caustic potash the coagulum produced by heat), if observed in a straight tube, appears green when placed between the eye and the sun, and reddish if the observer is placed between the sun and the tube.

A straight tube is requisite, because if a flask or any other vessel of a certain diameter is used, the liquid appears rose colored under all circumstances. If a half-filled flask is shaken the lower portion appears rosy, but the supernatant froth appears green. In a full flask, seen by reflected light, the whole appears rose colored; when seen by transmitted light the liquid contained in the spherical part of the flask always appears red; whilst that in the straight neck appears green. It is astonishing to observe the same liquid in one part of the vessel appear green and in another part reddish. These variations in no degree invalidate the certainty of the conclusion that no other substance than blood unites the characteristic successively observed in the experiment, namely:—

1. The red color of the liquid.
2. Its decoloration and coagulation at boiling heat.
3. The grey color of the coagulum, and its complete solubility in a small quantity of caustic potash.
4. The rose color of the alkaline coagulum seen by reflected light in a straight glass tube, and its green color under transmitted light.
5. The distinct and simultaneous appearance of two colors in a small straight-necked flask when the quantity of liquor is large enough to admit of its observation.

All this is without prejudice to the microscopic observation of spots and search for blood globules, which constitute the essential characteristic and most certain indication of the presence of blood.—*Chem. News, London, June 2d, 1861, from Journ. de Pharm. et de Chim.*

SOME REMARKS UPON SHELLAC, WITH AN ESPECIAL REFERENCE TO ITS PRESENT COMMERCIAL POSITION.

MR. MACKAY.

But to go still further from home, and to come more especially to speak of the article it is my intention very shortly to introduce to your notice, I may at once refer to the extraordinary position which shellac holds at the present time in the commercial world. This substance is known to us all, for although not used in medicine, it is extensively employed in the arts. Thus, it is the principal ingredient in our finer kinds of sealing-wax, while in that very important manufacture, hat-making, it is not only largely employed, but no substitute can be found. For wood-polish it is a necessary ingredient, and our pianos and other pieces of beautifully polished furniture, would be less pleasing to the eye were we deprived of shellac. In varnishes used by the upholsterer and others, its presence cannot be dispensed with; while the dye, which forms an integral part of this gum resin, is so much used by the woollen manufacturer, that even the gay clothing of soldiers would be dull and dim without the aid of the permanent and beautiful lac dye.

Before speaking of its commercial relations, it may not be uninteresting to refer more particularly to the manner and places of production. Our supplies are obtained chiefly from the East Indies, the districts most noted being Assam, Pegu, Bengal, and Malabar, and along the course of the Ganges.

The shipments are, however, made principally from Calcutta. In the districts above named there are two or three very large establishments at which they employ more than a thousand hands. Besides these factories, there are numerous makers on the small scale. A feeling of secrecy pervades the establishments, and strangers are refused admittance. On the twigs of certain trees, known as the *Ficus religiosa*, *Ficus indica*, *Rhamnus jujuba*, *Croton lacciferum*, and the *Butea frondosa*, found in the jungle and forests of India, a small insect called the *Coccus ficus*, fixes and there deposits a certain quantity of a dark colored resinous matter. This, on careful examination, has been found to be the stomachs of those insects left there after death as food

for their larvae, the outer or specially resin coating being intended for the shelter and protection of the young. It is about the months of November or December that the brood make their escape from their previously protected habitations, and fasten themselves in their turn upon the small branches. As these increase (which they do very rapidly) the twigs or stems become completely covered, and at a particular season of the year are collected, placed in sacks, and carried to the manufactory. These encrusted twigs are first ground in a mill to rough powder, and then carried away to what is called the dye work of the establishment. Here troughs are ready for their reception, and after being immersed in water, the natives commence and tread upon the material, so as to remove the dye from the resin, &c., and as this coloring matter is soluble, it is in a short time taken up by the water, run off into other suitable vessels, fresh water added, and the process continued, with the addition of fresh quantities of water, until the whole is completely exhausted. The remains are then collected, the woody fibre, &c., got quit of, and the little particles which remain freed almost entirely from color, called and recognized in our market as Seed Lac. The different waters which have thus taken up in solution the coloring matter of the stick lac, is run into cisterns or vats, where the deposition in course of time takes place, and then the powder in the form of paste is partially dried, put into square cases, stamped, and thoroughly dried, forming the regular lac dye of commerce. It is sent home to this country in those square blocks and reduced to powder for the purpose of trade. I may as well dismiss this part of my subject by stating, that this dye is used very largely and very extensively in dyeing woollen goods. Struck with a perchloride of tin, it becomes a fine and very beautiful scarlet. This preparation is well known, being made by boiling tin in hydrochloric and nitric acids, and from its general use for the above purpose has commercially received the name of *Lac Spirits*.

The great commercial importance of this article may be better understood when I mention, that from Calcutta alone the annual export is supposed to be very nearly four millions of pounds' weight.

The different kinds of shellac may be named as follows:—

Stick Lac.	Seed Lac.
Shell Lac.	Lump Lac.
Button Lac.	White Lac.

Various shades of some of the above receive the names of garnet, liver, and orange. These are dependent upon the quantity of natural lac dye left in the seed lac before it is prepared, as will be immediately noticed. The five kinds first enumerated are imported; the last is prepared in this country.

Stick and seed lac require little notice. The former is the natural production of the insect already described, and the latter is the remains after the extraction of the coloring matter to form the lac dye. The small granular pieces of gum resin left are collected as free extraneous matter as possible, and dried in the sun. Button and shell lac are the two descriptions most employed in this country, and are both prepared from the seed lac as follows:—The grains are placed in long sausage-shaped bags and heated before fires, until the liquid resin exuding slowly through the interstices of the cloth is scraped off, and immediately transferred to the highly polished surface of earthenware cylinders, heated by being filled with hot water. The melted lac is spread over these cylinders by men, women, or boys, who use for this purpose a palm leaf, and thus produce cakes about twenty inches square. It is then, when cool, thrown into chests, and by the transit becomes much broken ere it arrives in this country. The finest bright orange shellac is believed to be colored artificially, and I think correctly—having had occasion more than once to reject samples from their peculiar light yellow shade. Orpiment is thought to be the coloring matter employed.

Button, block, garnet, and liver lac, are all produced more or less carefully from different qualities of seed lac, the color and appearance depending entirely upon the districts from whence the seed lac has been obtained, and the completeness of the removal of the lac dye. Nothing more need be added as to the preparation of these lacs—and, indeed, I believe no further particulars are known. White lac is prepared in this country from ordinary shellac, by being first boiled in a solution of carbonate of potash, through which a stream of chlorine is then to

be passed. Hydrochloric acid is added, and last of all red lead. The white pulpy mass is then collected, washed, and pulled into sticks of different lengths. This description of lac is not much employed, being chiefly consumed in manufacturing the different light shades of fancy sealing-wax. Before proceeding to the closing part of these remarks—viz. the present commercial relations of this article—it may be stated that shellac should contain from 84 to 90 per cent. of resin alone, with varying quantities of coloring matter. When not carefully prepared, a quantity of sand is often present, which deteriorates the lac, and depreciates its value when used for varnishes, &c.

For about two years there has been a steady, but most unaccountable, rise in the price of all descriptions of lac. Thus, in October, 1858, the price in the London market, as well as in Liverpool, was 82s. per cwt. During the same month in 1859 it reached 128s. per cwt., and in October, 1860, it sold in the same markets at 260s. per cwt.; while in both the enormous price of £14 has, within the last fortnight, been obtained. At first sight, one is very apt to consider such extreme prices the result of speculation, but I have ascertained the last quotation from Calcutta, I mean in the market there, to be 57 rupees per maud. There are, I understand, 3 mauds to every 2 cwt., or a maud and a half to each 112 lbs.; so, allowing each rupee to be worth 2s. of British currency, we have the cost in India before shipment as £8 11s. The estimated expense of freight, &c., may be roughly stated at £2, which brings up the price on landing to £10 11s. This appears a very good margin for the importers. But it is said on pretty good authority that there are not at present fifty chests of really good, fine, orange shellac to be got in London. If this be correct, then the difference given above, between the net value as imported and the price realized here is not to be wondered at, nor can it be called excessive. It might, however, very naturally be asked, what is really the cause of such high prices and such scarcity? The most feasible reason, and I believe the true one, is that the native forests where lac has hitherto been found in such abundance, have suffered so dreadfully from the ravages and devastation of war, that the native collectors have failed entirely in obtaining supplies of the raw material. Now this is highly probable, for we know that

some of the largest lac factories are on the banks of the Ganges; but then in the more peaceful districts this reason cannot be considered tenable. I am somewhat inclined to suppose that there is really a natural scarcity in the jungle of the little lac-producing insect, and that these two causes, operating together, have brought about the present state of matters. One very incomprehensible thing is, that the prices of lac dye have not risen, and that there is a plentiful supply of this article in the market. This, of course, can only be accounted for in two ways—either, that the supply meets the demand, or that very large quantities have been stored up before the scarcity of lac began.

The quantity of all kinds of gum lac exported from Calcutta annually about eight years ago was supposed to be about 1800 tons, while, in 1858, it fell to about 700 tons, in 1859 about a fourth less, while during the present year the quantity has considerably increased. But in November, 1858, the stocks on hand in London and Liverpool were 3959 chests and bags; same month in 1859, 1316, and in November, 1860 (last month), 1345. Of these I cannot tell the relative proportions of orange, garnet, or livery. Of course, all descriptions are included. There are vessels, however, now afloat and expected to reach England in due course, having on board no less than 3192 chests and 363 bags of shellac, which, doubtless, if they do not sink to the bottom of the sea, ought to raise our home stocks, and tend to reduce prices; but we are told, on the other hand, that there is a large demand for the American and foreign market, while all our drug and other merchants at home are so bare of stock, that they will be ready to buy whenever the price moderates.

I dare say it must have occurred to more than one to inquire why, with such extravagant prices, some other substance or compound has never been thought of and introduced instead of shellac. This has been done, but most unsuccessfully. When in London, about eight months ago, I was shown an article which a company just established were about to make and sell instead of shellac. The price was £3 per cwt. cheaper, and those about to engage in its manufacture were sanguine as to the ultimate results. I was told, whenever it was ready to send out in quantity, a sample would be sent. Accordingly, about a month afterwards, a parcel arrived, regarding which my opinion was re-

quested. After carefully trying the article, I gave a report condemnatory of its use in any of the arts or manufactures in which the regular lac had hitherto been used. Although I was little thanked for this opinion at the time, I do not think the stuff I now show continued long to be made. Indeed, it really appears to be little else than a mixture of shellac and some aloetic resin, very probably Cape aloes. Be that as it may, I am satisfied from experiment that it could never come into competition with even inferior kinds of shellac.

In closing these few remarks, I may be allowed to express a hope, that lac has seen its highest price, and that during 1861 it will be considerably reduced. I am very unwilling to believe, that native supplies have really become extinct ; while the enormous comparative prices still existing, cannot but tend to increase that activity and energy in searching for fresh supplies, which will, I trust, result in sending more raw material to the native lac manufactories, and thus by increasing stocks at home, gradually reduce the market price to something more moderate, and approximating the steady prices at which shellac has until lately stood on the price list.—*London Pharm. Journ. Jan. 1861.*

ON THE UNCERTAINTY OF COMPOSITION OF THE AQUA LAURO-CERASI.

BY HARRY NAPIER DRAPER, F. C. S. L.

My object in this paper is to draw attention to the very uncertain constitution of cherry laurel water, and to the importance of providing some substitute in the shape of the much more stable hydrocyanic acid. Laurel water has on its side all the claim of antiquity, and I am aware that it is not easy to persuade the practitioner who has long been in the habit of prescribing any one remedy, to use another in its stead. I am also fully alive to the importance of caution in presuming upon the value of any therapeutic agent, solely from its chemical composition, seeing that we possess many very valuable remedies, about the constitution of which we either know nothing, or nothing which will serve to elucidate their mode of action. If, therefore, experience pointed out any difference in the effects of laurel water and of

dilute hydrocyanic acid, a proposition to substitute the latter for the former would be unjustifiable; but as it is the opinion of all who have written upon the subject that the action of the two remedies is in every respect the same,* if we become convinced that we gain an important advantage by the change we should certainly adopt it.

The aqua lauro-cerasi is not included among the formulæ of the London Pharmacopeia, but finds a place among those of the Pharmacopœias of Dublin and Edinburgh. The process for its preparation is in both of these essentially the same. One pound of fresh laurel leaves are digested in two and a half pints of water, and a pint of the liquid is distilled over and filtered. Laurel water as thus prepared is nothing more than a dilute solution of hydrocyanic acid, to which the presence of a small quantity of volatile oil gives its peculiar odor and taste. The dose is by no means well fixed, being given by some authorities at from ten minims to twenty minims, and according to others ranging from 3ss. to 3i.

The leaves of the cherry laurel have never been perfectly examined, but of the nature of two of their constituents there exists no doubt. These are—firstly, a volatile oil, resembling in its physical properties very closely that obtained from bitter almonds, and in chemical constitution agreeing with it in every particular; secondly, hydrocyanic acid. Both of these substances are, as has been already stated, held in solution by the distillate from the leaves.

The chief cause of the uncertainty of this preparation lies in the fact that the quantity of hydrocyanated oil obtained from the leaves varies with their age. Thus Christison found that 1000 grains of the buds and unexpanded leaves of May and June gave 6.33 grains of oil, but when they had in July attained their full size the same quantity yielded but 3.1 grains, while in the May following the quantity had diminished to 0.6 grains. Not only is the quantity of oil liable to variation, but what is still more important, the quantity of hydrocyanic acid which it con-

*According to Göppert, however, the poisonous action of cherry laurel water does not depend on the hydrocyanic acid which it contains, but upon some property peculiar to itself.

tains is uncertain. It is stated by some writers to contain 2.75 per cent.; while according to others who have investigated the subject, it may exist in as large a proportion as 7.66 per cent. Christison confirms this discrepancy, he having obtained from developed young leaves twice as much acid as from old ones. Then, again, while it is well known that the leaves are constantly employed with impunity as a flavoring for articles of food, many cases have occurred in which serious results have supervened from their use in this manner. In a case cited by Dr. Paris, several children were nearly poisoned by eating a custard so flavored. Zeller states that the leaves gathered in wet cold weather yield more hydrocyanic acid than when they are collected in a hot, dry season.

From this collection of facts it will be seen that it is impossible for any two samples of laurel water to contain the same proportion of active constituents, but this is by no means the only source of error. Others which are no less conducive to uncertain composition creep in during the process of manufacture. As the whole of the oil comes over in the distillation with the first few ounces of water, if the whole product be not strongly agitated before filtration, a uniform preparation will not, even if other conditions be favorable, be obtained. Moreover, constant variations from the process given by the *Pharmacopœias* are frequently adopted to suit the conveniences of manufacture on the large scale. The most usual of these modifications consists in passing steam through a vessel containing the crushed leaves until the condensed vapor measures the proper quantity. More rarely it is prepared by agitating a known proportion of the oil with distilled water, as is practised in the preparation of the aromatic waters of the *Pharmacopœia*.

In addition to the above sources of inaccuracy, there is one other which has by no means attracted the attention which the importance of the question seems to me to deserve. It is this: Liebig and Wöhler, though unable in their analysis of laurel-leaves to detect *amygdaline*, concur in opinion as to its existence. If this be the case—and all analogy leads to the inference that it is—the well-known action by which this body gives rise to hydrocyanic acid should surely not be overlooked, as the duration of the digestion of the leaves in water, now considered as a matter of but secondary

importance, would then exercise considerable influence over the amount of active matter contained in the product. Closely connected with this part of the question are the results obtained by Pereira in experimenting on bitter almond oil. He found that a quantity of this substance which had been carefully purified, and in which he could not detect a trace of hydrocyanic acid, gave, after having been kept for a few months, distinct evidences of its presence. If we assume—as we can scarcely avoid doing—that an analogy exists between this oil and oil of cherry laurel, another condition of change is introduced, and an increase of hydrocyanic acid in the water must result from its being kept. Experiments in this direction are, however, still wanting.

My next step is naturally to inquire in what degree this inconstancy in the composition of laurel water, which we assume upon theory, is borne out by experience of its effects, and we find that here facts bear us out more fully even than before. A short summary of these facts will, while occupying less space than a more detailed account, at the same time illustrate the case more clearly.

Fonquier has given *twelve ounces* in the course of a day without any evident effect.

In 1781, Sir T. Boughton was poisoned, death resulting in half an hour by *two ounces*.

In another case, quoted by Taylor, *one ounce and a half* caused death in an adult.

Then as regards chemical analysis, Pereira (quoted by Taylor) gives the average strength as equal to a solution of hydrocyanic acid containing 0.25 per cent. Two samples which I have examined, and which were obtained from two of our first pharmaceutical laboratories, yielded respectively 0.011 and 0.009 per cent.; in fact, mere traces, the numerical value of which could not, but that large quantities were operated upon, have been stated at all.

Surely further evidence is not needed to show that this preparation is most inconstant, and that even if, on the one hand, no bad results often ensue from its administration; on the other, the practitioner must frequently experience much disappointment from the inactivity of a medicine which he believes to contain 12 per cent. of pharmacopœial hydrocyanic acid.

As it is not likely that in this country, where, from long usage, laurel water has become firmly established, the much more stable and reliable hydrocyanic acid will ever supersede it, I would suggest two methods by which the evil may be, if not wholly remedied, at least palliated, and the preparation at the same time be retained.

The first of these is, that as laurel leaves can be obtained at all times of the year, the preparation should be much more frequently made, and, when made, be standardized in the manner directed by the London Pharmacopœia for fixing the strength of its dilute hydrocyanic acid. In this way a uniform product, as far at least as the acid is concerned, would be obtained.

By the second method the pharmacist would be rendered independent of circumstances which might prevent fresh—and especially young—leaves being obtained, and moreover the proportion of volatile oil in the liquid, which by the first method could not be constant, would be always the same. I propose, then,—firstly, that the volatile oil be distilled from the leaves, and, by any of the well-known means, wholly deprived of hydrocyanic acid, the subsequent formation of which might be guarded against by keeping some peroxide of mercury in the bottle which contains it; secondly, that a fixed proportion of this oil be dissolved in distilled water, and that hydrocyanic acid of known strength be added to the solution in such quantity as to make it bear an easily remembered relation of strength to the dilute acid of the Pharmacopœia.

It is clear that the time for such a change will be upon the advent of the new Pharmacopœia; but by way of example, supposing that a dilute acid of 2 per cent. be decided upon, the following would be an advantageous formula for the preparation of *aqua lauro cerasi*:

Dilute hydrocyanic acid	35 grains.
Volatile oil of cherry laurel	5 "
Distilled water	4 oz.

This solution would contain 2 per cent. of hydrocyanic acid (which in its turn would contain 2 per cent. of real acid), or in the other words, 50 minimis would be equivalent to one *minim* of dilute hydrocyanic acid. From the facility with which this water could be made, no valid excuse could be found for not

throwing it away when from any cause it had become deteriorated.—*Dublin Med. Press, Dec. 4, 1860, from London Pharm. Journ. Jan. 1861.*

ON ARNICA MONTANA, Linn.

By G. F. WALZ.

After stating the importance of arnica as a medicine, the author mentions the results of the investigations of the flowers by Weber, Martini, Gressler, Chevallier and Lassaigne, Thomson, Versmann, Bastick and Lebourdais, and the analyses of the root by Pfaff and Weissenburger; the herb has never been carefully analyzed. Having 100 lb. of the latter at his disposal, the author examined first for volatile oil, but obtained merely an oily film. The whole quantity of herb was exhausted with boiling water. The brown infusion has a slight acid reaction, is darkened by alkalies, and precipitated green by ferric salts, and yellow by salts of lead and other metals.

The infusion was precipitated by subacetate of lead, from the clear nearly colorless filtrate, the lead removed by carbonate of soda, and the decanted liquid precipitated by tannin. The precipitate is soluble in water; it was washed with little water, pressed, dried and treated with alcohol. The tannin was removed from the tincture by litharge, decolorized by animal charcoal, distilled, and the residue set aside. After several weeks, white felt-like crystals, sparingly soluble in alcohol and entirely tasteless, were separated together with some fat, which crystallized from hot alcohol at 12 to 15° C. (59° F.) in feathery, silky needles, drying to a fragile mass of faint, fatty odor, and fusing between 25 and 30° C. (77 and 86° F.) The above crystals were likewise obtained from the root and flowers, and will be noticed hereafter.

From the mother liquor, which possessed the acrid and bitter taste of the herb, no crystals separated on further evaporation, but water precipitated white floccules, gradually becoming a yellowish oily mass. The liquid was not precipitated by alkalies, but acids threw down a white oily mass; the same body was dissolved from the liquid by ether, from which it separated on

evaporation as white warty crystals, becoming soft and balsam-like by a gentle heat. This is the acrid body, named by the author, arnicine.—(N. Jahrb. f. Ph. xiii. 174.)

After the removal of the ethereal liquid, the aqueous liquor was turbid, and left on the filter a brownish mass, consisting of a resinous body, soluble in alcohol, and some of the above white body crystallizing from hot alcohol. The alcoholic solution, after removing coloring matter by animal charcoal, left on evaporation a yellowish-brown body, from which ammonia separated some arnicine, leaving the resin behind.

The aqueous filtrate was of a dark color, and a bitter and still acrid taste; oxide of lead removed much coloring matter, and on evaporation, a yellowish, very hygroscopic powder, of a bitter, acrid taste, remained behind. This was treated with absolute alcohol, which left gum and sugar behind. After distilling off the alcohol, the amorphous residue was treated with ether; on evaporating this solution a scarcely colored, very acrid, resinous body remained behind. It was dissolved by ammonia, from which solution a white, silky crystalline powder separated, which proved to be a wax.

The ammoniacal solution left the arnicine on evaporation, as an amorphous mass. Neutralized with muriatic acid, a turbidity, and afterwards floccules, appeared, which united, assuming a resinous appearance. This arnicine is sparingly soluble in water, but imparts to it its acrid persistent taste, and produces with tannin a flocculent precipitate. Its behaviour to reagents is as follows: bichloride of platinum, after some time, a yellowish-white precipitate; nitrate of silver, white voluminous; protoneitrate of mercury, white bulky; terchloride of gold, yellowish-white, bulky; subacetate of lead, white; baryta, even in alcoholic solutions, crystalline; alkalies deepen the color. Acids produce on standing or boiling, a flocculent precipitate.

Arnicine deprived of all adhering moisture, is a golden yellow mass, which dissolves in alkalies, the solutions leaving on evaporation a sticky mass; the ammoniacal solution, however, pure arnicine. Sulphuric acid colors it yellowish brown, nitric acid produces a tough resin, hydrochloric acid dissolves it slowly, the solution becomes turbid on the addition of water. It contains

no nitrogen ; dried at 212° F. Three analyses gave the following results :

	Calculation.	Analysis.
70 C.	71.60	71.52
54 H.	9.20	9.23
14 O.	19.20	19.25

The author supposes arnicine to be a glucoside, and remarks that the analyses likewise agree very nearly with the formula $C_{48}H_{36}O_{10}$. Boiling with acids appears to yield several secondary products of decomposition.

Oil of Arnica.—The flowers contain little volatile oil of a yellow color, not blue as asserted by Martius.

Analysis of the flowers.—120 lb. of flowers several years old, were exhausted with boiling water, the infusion precipitated first with subacetate of lead, and after removing the lead, with tannin. The latter precipitate was exhausted with alcohol, the tannin removed by oxide of lead, and the crystals separating on cooling, freed from the solution by filtering and washing with water ; they were identical with the above oil. After distilling off part of the alcohol, the above mentioned wax crystallized, and the mother liquor now yielded with water a turbidity, and flocules of arnicine. The filtrate therefrom still had an acrid and very bitter taste ; it was evaporated and treated with absolute alcohol, which left a tasteless mass. This tincture was decolorized by animal charcoal, the alcohol distilled off, and the dry residue digested with ether. On evaporating the ether spontaneously, a yellowish, oily mass, of a bitter, acrid taste, was left intermixed with oblique rhombic prisms of acetate of soda.

On dissolving in alcohol, some scales of the fat and wax were left ; the solution was precipitated by water, leaving the acetate of soda in solution. After having distilled off the alcohol, tannin precipitates more arnicine, which is obtained pure by digestion with oxide of lead and subsequent spontaneous evaporation.

For preparing arnicine, Professor Walz recommends, besides the process just mentioned, the following :

1. The flowers are exhausted with ether, this distilled off, and the residue treated with alcohol of .850 spec. grav., which dissolves arnicine with little fat, to be purified by animal charcoal, and repeated solution in weak alcohol.

2. The alcoholic tincture of the flowers is agitated with animal charcoal, and the extract treated with ether, the solution is shaken with some liquor potassa to remove a resin, and then evaporated. The residue is treated with alcohol of .850, and further as before.

The author reviews then an inaugural essay by Erichsen in Dorpat: "De floribus Arnicae Montanæ," an abstract of which is published in Cannstatt's *Jahresbericht* for 1858. He exhausted the alcoholic extract with ether, agitated the solution with solution of potassa, and evaporated the ether; the residue was treated with alcohol and the solution evaporated. The mass had an acrid and bitter taste like the flowers; dilute acetic acid dissolved the bitter principle, the acrid residue becomes tasteless when boiled with concentrated acetic acid; but this solution as well as that in dilute acetic acid, left on evaporation a radiating crystalline mass of very bitter taste, but destitute of the properties of arnica flowers. Erichsen concludes that the active principle is easily altered and has not been isolated yet.

Prof. Walz, on repeating the experiments of Erichsen, states that the crystalline bodies left after evaporating the dilute and concentrated acetic acid solution, are pure arnicine, mixed with some of his wax, while the tasteless substance is nothing but resin fat and chlorophyl.

The author found in the flowers, arnicine, yellow volatile oil, two resins, one soluble and one insoluble in ether, tannin, yellow coloring matter, fat fusing at 28° C., and wax. He is now occupied with an analysis of the root, when he will give more information about the properties of the various constituents. Professor Friedreich is investigating the medical properties of arnicine.—*N. Jahrbuch f. Pharmacie. Wittst. V. Schr. x.* 188-206.

ON THE VOLATILE OIL OF PINUS PUMILIO, Hænke.

By C. H. MIKOLASCH.

Mr. Mack, pharmacist of Reichenhall, obtains this oil in preparing the now much employed so-called pine leaf baths, by cutting and bruising the young branches with the leaves, and boiling them in a still with water. The limpid, light and pale

yellow oil was analysed in Buchner's laboratory by C. Mikolash, and found to have many properties in common with the volatile oil, obtained from the twigs of *Pinus abies* freed from the leaves, which was analyzed a few years ago by Woehler.

It has a very agreeable balsamic odor, widely differing from oil of turpentine, and merits, therefore, to be substituted in medicines for this less agreeable oil ; being very thin, it is well adapted for embrocations. Visitors to the baths at Reichenhall take this oil along to their homes, and sprinkling it into their rooms, are thus enabled to inhale in winter, and at their own firesides, the balsamic air which they found so strengthening in the Alps.

The crude oil has a specific gravity of .893 at 17° C., and boils at 152° C. Iodine acts less energetically than upon oil of turpentine, and atmospheric oxygen is not so strongly ozonized as by the latter. By rectification it is obtained colorless, but its odor is not improved. By treating it with potassa, and repeatedly with potassium, it became thicker and dark brown ; the distillate from this in an atmosphere of dry carbonic acid, had the composition of oil of turpentine, a specific gravity of .875, much altered, less agreeable odor, and turned at 20° C., and with a column of 25 centimetres polarized light 18° to the left ; the oil merely rectified with water turned it 16°. It absorbs much hydrochloric acid gas, and increases nearly one-third in its volume, without separating a solid compound. Freed from the excess of acid, it was a yellowish liquid of an agreeable odor, resembling oil of thyme, and had the composition $C_{20}H_{16}$, HCl . No solid sublimate was obtained by heating it after Berthelot's method with fuming nitric acid.

The volatile oil obtained as above, of *Pinus pumilio*, consists of an oxygenated portion, and of one carbohydrogen of the composition of oil of turpentine.—*Buchner's N. Repert.* ix. 337-345.

J. M. M.

ON OXYACANTHIN.*

BY CHARLES WACKER.

The author gives a condensed account of the investigations of G. Polex (Archiv d. Ph. 2 R. vi. 265), Kemp (Buchn. Rep. lxxi. 166), and Wittstein (Präparatenkunde 595), the latter having observed it in a Mexican species of *Berberis*.

About 2 lb. of the precipitate produced by carbonate of soda, in the mother liquor of *berberina*, were treated with dilute hydrochloric acid, filtered and precipitated by ammonia. The precipitate was washed with water, dried, powdered and exhausted with ether, which was evaporated, the extract left behind was redissolved in dilute hydrochloric acid, and now yielded with ammonia an almost white precipitate. This was converted into the hydrochlorate, a portion of which was obtained in colorless crystals, which yielded with ammonia a purely white precipitate. The colored hydrochlorate was obtained colorless by recrystallization.

The residues from the treatment with ether was darker brown than the original precipitate, and weighed only about one-eighth less; its taste was bitter; its solution in acids yielded the same precipitate with alkalies. It appears to be the alkaloid combined with a tannic acid, the former of which was partly liberated by treating with carbonate of soda and exhausting by ether.

Properties of the alkaloid.—It is a white powder, remaining unaltered in the shade, but turning yellow in the direct sunlight, the solution of the latter in acids, yielding it white again on supersaturating with alkalies. Under the microscope it appears as amorphous globules, but crystallizes from concentrated alcoholic and ethereal solutions in fine colorless needles and prisms. Its taste is purely bitter, not very persistent. It fuses at 139° C., is decomposed at a higher heat, and burns upon platinum foil without leaving any residue. Alcohol dissolves much of the

* Berzelius proposed for this alkaloid the name *berbina*, to distinguish it from *berberina*, and indicate its occurrence in *Berberis vulgaris*. Mr. Wacker now suggests the name *vinetina*, derived from *vinetier*, the French name for barberry.

alkaloid, but separates a part in needles, which require 30 parts cold, and 1 part boiling 90 per cent. alcohol for solution; the cold solution has a bitterish taste and slight alkaline reaction. The crystals require 125 p. cold and 4 p. hot ether for solution. It is freely soluble in chloroform, and with the aid of heat in fixed and volatile oils.

It yields with concentrated sulphuric acid a clear, somewhat yellowish solution; with nitric acid a brownish yellow solution, separating warty and needle-shaped crystals; with chromate of potassa and sulphuric acid, gradually chromic oxide; and with chlorine water, a yellow solution, becoming darker, not turbid, with ammonia; from iodic acid it liberates iodine.

The neutral hydrochlorate gives with alkalies a white precipitate, soluble in excess and in much ammonia; with alkaline carbonates, a white permanent precipitate; with nitro-pieric acid, a lemon-yellow precipitate, readily soluble in an excess, in alcohol, acetic, nitric, muriatic and sulphuric acids, and in much water; with tannin, a yellowish white turbidity; with iodide of potassium, a white, and in the presence of free iodine, a brownish yellow permanent precipitate; with sulphocyanide of potassium, white permanent floccules; with ferrocyanide of potassium, white; with the ferrid cyanide, sulphur-yellow; terchloride of gold, yellowish; bichloride of mercury, white, fine floccules, soluble in water; with bichloride of platinum, pale, greyish yellow; with proto-nitrate of palladium, brownish yellow, nearly orange colored; and with phosphomolybdic acid, a yellowish white precipitate.

The alkaloid loses 1HO at 100° C., and consists then of $C_{32}H_{22}NO_{11}$.

	Calculated.	Formed by 4 analyses.
32 C.	60.568	60.264
23 H.	7.256	7.526
N.	4.416	4.514
11 O.	27.760	27.696

The equivalent is 3962.5 (O=100; or 317, H=1), which is corroborated by the platinochloride, which contains in 7.5 grs. 1.4108 gr. platinum.

Salts.—The hydrochlorate dried at 100° C. contains 4HO, and is readily soluble in alcohol and water, and crystallizes in

white warts. The sulphate is anhydrous at 100° C., and otherwise resembles the former. The two following salts are less soluble in water; the nitrate contains 4HO, and crystallizes in warts and needles; the anhydrous oxalate appears in needles. The acetate could not be obtained in crystals.

The military surgeons, Dr. Broxner and Dr. Ettinger, are now trying its medicinal effects.—(Wittst. V. Schr. 177-188.)

J. M. M.

NOTE ON FRENCH OPIUM.

By M. H. LEPAGE, PHARMACIEN.

For some years past, many persons, amongst whom it is but right to place foremost M. Aubergier, of Clermont-Ferrand, have been engaged in the collection of opium, one of the most precious drugs of the *Materia Medica*.

If the different species or varieties of the genus *Papaver* yield opium, all do not produce it in equal quantities. Thus, the white officinal poppy, the pink poppy, and the purple poppy, upon which experiments have been especially made, must be arranged in the following order as regards their produce: 1, the white poppy; 2, the purple-brown poppy; 3, the pink poppy. On the other hand, the opium obtained from these different poppies must be classed as follows, according to their richness in morphia: 1, opium from the pink poppy; 2, that from the purple; 3, that from the white officinal poppy. Thus, whilst the opium from the pink poppy yields from 14 to 23 per cent. of morphia, that of the white poppy never contains more than from 5 to 8 per cent. As to the opium from the purple poppy, which appears to be that in which the quantity of morphia varies the least, it yields from 10 to 12 per cent. These facts result from the united experience of MM. Aubergier, Decharmes, Bénard, O'Reveil, and Mialhe. (See *Pharmaceutical Journal*, vol. ii., series 2, page 229.)

With such results, I ask myself, if the collection of opium is a work which may really be put in practice without much trouble, why pharmacists who are placed in favorable situations, as most are who live in small towns, do not take upon themselves

this cultivation, were it only for their own consumption ? For my part, I set to work and have obtained, as you see below, various satisfactory results. I began my experiments in 1857, and repeated them in 1858 and 1859. It is the brown-purple poppy that I cultivate, as yielding opium in which the proportion of morphia varies the least, and also that in which the proportion is similar to that which the best foreign opium used in pharmaceutical preparations should contain. Here is the summary of my proceedings :—

In soil well manured, in March, from the 1st to the 15th, I sow in rows, 25 centimetres apart (nearly 10 inches), my poppy-seed mixed with a little sand ; I then roll it, and when the plant is well up, that is to say, in about four or five weeks, the weeds which have sprung up between the rows, and which must injure the development of the young plant, are cut away ; a little later, towards the 15th of May, it is necessary to weed with the hand, an operation which not only destroys the weeds, but also helps to thin the poppy plants, for these latter are always too thick, whatever precaution may be taken in the process of sowing. The weeding ended, nothing remains to be done until the time for collecting the opium, which takes place generally from the 8th to the 15th of July.

Moreover, if it is important not to wait until the capsules begin to turn yellow before the incisions are made, it is equally so not to begin on capsules yet too green, unless you wish to see the juice, yet too thin, run down and partly be lost. Experience will very soon show when it is time to begin the work ; but at this point the operations must be conducted judiciously, for when the poppies begin to turn yellow, the juice flows scarcely at all. The laticiferous vessels being at the circumference of the capsules, a superficial incision is sufficient to reach them, whilst an incision which would penetrate within the capsule would permit a portion of the juice to flow into it, and would thus diminish by so much the produce. More than this, it would cause a disappointment in the loss of some of the seeds when the capsule was ripe. The incisions should be circular rather than perpendicular. The same capsules may be incised two or three times, with an interval of twenty-four hours, and will supply each time a fresh quantity of opium.

A good operator may collect 100 grammes of opium in a day, but more frequently only from 70 to 80. A method of accelerating the operation consists in one person making the incisions whilst another takes away the juice; in which case, it is well that the person who incises should be at least an hour at his work in advance of the one who collects, so as to give the opium juice time to partly harden on the capsule.

The juice collected each day should immediately be spread in thin layers upon plates, and placed in a spot heated to 86 or 95 degrees, in order to dry it quickly,* and when the gathering is over, the whole is mixed in a marble mortar, and produces a paste of sufficient consistence to form into cakes of from 50 to 100 grammes each. These latter are further dried in the open air. It is in this way that we obtained the opium which we sent in 1859 to the exposition of Rouen.

I found, in the opium of my gathering of 1857, by the excellent process of M. Fordos, 12.50 per cent. of morphia; M. Réveil, however, to whom I sent a sample, could find but 11 per cent., following the same process. The opium of this year's gathering has produced me 11.50 per cent.

After the collection of the opium, that of the capsules must be attended to when they are ripe, in order to remove the seeds, which yield a valuable fixed oil.

I subjoin a table of the cost of the opium which I gathered in 1859:—

	fr. cen.
Rent of 8 ares (about one-fifth of an acre), at 2 fr. per are	16 0
Manure 10 0
Labor 6 0
Sowing 10 0
Weeding 5 75
Expenses of collecting the opium 21 75
 Total	 69 50

Produce obtained:—500 grammes of opium; 48 kilogrammes

* According to M. Bénard, if the opium juice be dried too slowly, a part of the morphia which it contains is transformed into another substance.

of seed, which have furnished 17 kilogrammes of oil, in value 27 fr. 20 c. There remain then 42 fr. 30 c. for the 500 grammes of opium.—*Echo Médical de Neuchâtel* and *Journal de Pharmacie d'Anvers*.

PURIFICATION OF VEGETABLE JUICES.

Presented to the French Academy of Sciences, January 14, 1861.

BY M. EMILE ROUSSEAU.

In the saccharine juices of vegetables, that of the best not being taken as an example, there are found two kinds of organic substances, which must interfere with the extraction of the sugar.

The first belongs to the group of albuminoid and caseous substances. It undergoes all the modifications which reagents produce on solutions of albumen and casein. The salts of lime and lime itself coagulate it; but the latter, whether by its proper alkaline action it dissolves a portion of the vegetable substance and retains it in combination as was lately shown by Frémy, or because it sets free some potassa or soda, causes the saccharine juices treated by it to remain always alkaline, after the action of carbonic acid. These two effects are often united, and an ulterior alteration of the syrup takes place, which is recognized in the commonest kinds of sugar.

The second substance is colorless ordinarily, as long as it remains in the cellules of the vegetable, but very greedy of oxygen, coloring rapidly under the influence of air, suffering modifications rapidly from the action of oxidizing agents, so that it is entirely converted into the well known substance which is produced, when vegetable juices are evaporated or entirely destroyed. This substance, when deprived of albuminoid matter, reduces, with the aid of heat, the salts of silver, protoxide of mercury, &c. Through the action of this latter body the solution takes the same color which the juice acquires by long exposure to the air.

The facts being established, the problem, how to simplify the fabrication of sugar may be stated thus: wanted (1) a substance of slight solubility, capable of coagulating all the albuminoid substances, without any injurious action either upon the sugar or upon health, capable of ready withdrawal from the juice in

cases where it had been retained to a certain extent in solution, and finally procurable at low cost; (2) another substance possessed of a (so to speak) limited oxidizing power, which, by its own action, could destroy the coloring substance, or transform it into the brown substance and absorb it then,—which, in a word, could unite the qualities of innocuousness and absorbent action required in the substance first referred to, and be had at a low cost.

Sulphate of lime, whether natural or artificial (crude or boiled plaster), is, of all bodies which I have studied, best fitted to meet the first indications. It is neutral—an essential condition—has no action on sugar, and is of very slight solubility; it unites to the conditions of innocuousness and cheapness, the most remarkable coagulating effects on the albuminoid substances contained in the vegetable juices, especially in that of the beet. This property is such that its solution even answers, in amount relatively very small, to produce the effect. The operation of defecation can be executed under excellent conditions and with very little of the substance; the scum becomes very consistent, collects well, and the juice may be readily strained in a condition of suitable limpidity. Sulphate of lime removes then perfectly all coagulable substances, but it does not touch the coloring substances, so that the juice after the separation of the scum soon becomes very deeply colored.

Animal black is almost without effect immediately after defecation; it only removes the substance that has already oxidized, and after its action, the juice whose color has been greatly diminished, is not slow in becoming again colored. An oxidizing body is required which is able to effect in a very short time that which the air effects but slowly, or which shall have the power of destroying or absorbing the substance. Hydrated sesquioxide of iron presents most the advantageous properties of all that I have examined.

After all the coagulable substances have been removed from a saccharine juice, if it be agitated in the cold, or at a temperature which must never be as great as that of ebullition, with hydrated sesquioxide of iron, the filtered liquor will come through perfectly colorless and purified from the entire presence of all the foreign substances which it contains. Moreover, the sesquiox-

ide of iron, on account of its property (well known to chemists) of absorbing alkaline and earthy salts, removes the small quantity of the sulphate of lime which was left in the solution. Thus, the juice which, after defecation by sulphate of lime, reduced nitrate of silver, protoxide of mercury, &c., will produce no alteration in these, after its own contact with oxide of iron.

The juice, when it proceeds from a vegetable taken in a normal condition, is perfectly neutral to test paper, after this purification, and may be preserved in contact with the air for several days, without its undergoing the slightest alteration or coloration, which proves that all the substances capable of acting the part of a ferment have been removed. It can be boiled, without coloring under the action of the heat. The syrup carried to the point of candying possesses only the slight yellow color peculiar to all the purest syrups. Its taste is pleasant, devoid of that saline and disagreeable taste which is found in the syrup of the beet, and it preserves a remarkable fluidity and limpidity. It crystallizes readily, the crystals being white.

As the last proof of a good purification of saccharine juice in this way, if we add to some of the boiled syrup a sufficient quantity of water so that the areometer could stand at from 25° to 30°, and then mix it with a large excess of alcohol of 90, there will be produced neither turbidness nor deposit after days standing,—showing that not a trace of air is present.

Henceforward the manufacture of sugar is reduced to the following manipulations: to heat the saccharine juice in a boiler along with a few thousandths of sulphate of lime (crude plaster is the best), all the coagulable substances will collect in a compact scum: the clean juice is then agitated with the sesquioxide of iron. After the separation of the sesquioxide, it only remains to evaporate the water, that is to say, to boil it.

The form of hydrated sesquioxide of iron which seemed most fitted was that of a consistent paste. A litre weighs about 1.145 grm., containing from 70 to 80 parts to 100 of water. The quantity to be employed varies with the nature of the vegetable, its own condition and state of preservation. It should not exceed, as the extreme limit, 8 to 10 parts to 100 of juice,—which amounts to about 2 parts to 100 parts of solid substance, the remainder being water.

After it has been employed with defecated sugar, it assumes a color almost black, contracts and readily separates from the liquid. When it has been kept on hand, it is only necessary to wash it in warm water,—after having exposed it for some time to the air, so as to give the organic substances that it has entrapped time to be destroyed,—in order that the deoxidized portion may regain oxygen from the air in the place of that which it has lost. Its employment, as appears, is for an indefinite length of time,—and expense of a very insignificant character is required for its revivification. The happy property of indeterminate regeneration removes all questions as regards the amount employed.

I would add that heretofore its price has been much less than that of animal black, as it can be obtained from 5 to 6 francs for 100 kilogr., and the price will undoubtedly be reduced in the future.

It will be understood that nothing is herewith proposed, based on means more or less empirical, nor upon the action of machines more or less ingenious, whose effects are subordinated to variable conditions or changes ; it rests on determinate chemical relations, so precise that they furnish the explanation at the same time that they give certainty. Sulphate of lime and sesquioxide of iron will remove foreign substances from sugar, and are inferior to no other substances in this respect.—*Cosmos, from Journ. and Trans. Md. Coll. Pharm. June, 1861.*

L. H. S.

PREPARATION OF BONES FOR USE.

The best and cheapest method of preparing bones for manure is, first, to boil them in strong ley a few hours, to extract from them the animal matter, or what would be more convenient, perhaps, break them as fine as convenient, and put them in a tub of ley to remain there during pleasure, until the animal matter is all extracted and incorporated with the ley. The mineral part of the bones will now be found very friable and easily pulverized. They should be rinsed clean, pulverized, and put into another tub or trough. Apply to them some diluted sulphuric acid, in the proportion of one of acid to five of water.

Stir them frequently, and in a short time, they will be entirely decomposed and fitted for use. These two masses, being equally rich in the elements of fertility, the one of ammonia and the other of phosphorus, are equally valuable as fertilizers, and adapted to any and every variety of soil that may be deficient in these elements, and equally necessary for the healthful maturity of every growing plant, whether of grain, grasses, fruits, or roots. I now advise a mixture of these two masses with the general compost, to secure a general diffusion of them upon the different fields to be manured. My reason for the general diffusion of these masses, upon the different fields is, first, every plant needs them. Secondly, the farmer's resources, in this line, will be mainly within himself. This will be true of those that live at a distance from villages and cities. Their resources must be small. Thirdly, the elements of the bone, both animal and mineral, were taken from the different fields, and should, therefore, be returned to the same fields. To keep up the fertility of each field, it is necessary to return to it annually the same elements that are taken away. The farmer may secure a larger crop of any kind, on any field, by robbing other fields of the same elements of fertility to enrich that one. But such a policy would not only be bad, but ruinous if pursued.—*Drugists' Circular, from Country Gentleman.*

CARBONIC ACID IN THE SOIL.

Van den Broek says (*Annalen der Chem. und Pharm.*, Bd. cxv. s. 87) that a solution of carbonic acid percolating through the soil, is, up to a certain limit, robbed of its carbonic acid, so that the filtrate no longer causes any turbidity with lime-water; and, if a stream of hydrogen gas be passed through a layer of earth, the carbonic acid can be displaced. The author lays stress on this property of the soil holding carbonic acid, as supporting Liebig's views on the subject of the nutrition of plants.—*Chem. News, London, March 16, 1861.*

(Continued from page 376.)

the water. One of the constituents often then remains in the form of microscopic crystals or as an amorphous powder, at least for a short time, undissolved, and can be separated from the other bodies easily and quickly soluble in water by a rapid filtration.

We will now apply our attention to the *precipitates* which are thrown down by a *solution of alum and ammonia from a portion of the watery decoction*.

The *precipitate* washed on the filter with water is treated with *dilute sulphuric acid*, and allowed to remain some time in contact with the same, accompanied with frequent stirring. For this purpose, the precipitate on the filter is introduced into a capacious glass vessel. The solution is filtered from the portion remaining undissolved, and this is washed on a filter with water. The residue washed with water is treated with *hot alcohol*, wherein such substances dissolve. These can be precipitated from the alcoholic solution by *water*, and after being washed with water, may be preserved for a closer examination by being dried in *vacuo* over sulphuric acid.

The *solution obtained by the application of dilute sulphuric acid* is mixed with a saturated solution of *sulphate of potassa*, whereby the alum is reformed, and at the same time is partially precipitated. The fluid is mixed with *anhydrous alcohol* as long as an addition of the same produces a precipitate of alum and sulphate of potash, and the spirituous liquid is filtered from the precipitate. The quantity of sulphuric acid which is still present in the fluid in a free condition is separated by the introduction of moist *white lead*, prepared by passing carbonic acid into subacetate of lead. The sulphate of lead is separated by a filter, and the small quantity of lead dissolved removed from the liquid by sulphuretted hydrogen. After filtering off the sulphuret of lead and expelling the sulphuretted hydrogen, the alcohol is distilled off and the watery residue employed for further investigation. It is self-evident that the greatest portion of the substances contained in this fluid are those which were precipitated by sugar of lead and subacetate lead from a portion of the watery decoction, with the exception of those which are not precipitated with alum, or remain undissolved by the treatment of the aluminous precipitate with dilute sulphuric acid. This fluid is therefore treated exactly as is above described with the first portion of the watery decoction—namely, with sugar of lead and subacetate of lead, and the resulting precipitates are examined in precisely the same manner.

It was mentioned before that a part of the watery decoction was to be treated with animal charcoal, and the charcoal washed with water and extracted with boiling alcohol. This alcoholic extract may contain coloring matters, indifferent bitter principles, organic bases, &c. After its evaporation, either *crystals* are separated which can be removed from the mother liquor, or no crystals are formed. The whole residue, where no crystals have separated, or the mother liquors from which the crystals have been

removed, must now be subjected to a more minute investigation. The examination of the mixtures of substances which are contained in the fluids which are filtered from the precipitates produced by acetate and subacetate of lead in one portion of the watery decoction, and from the precipitates caused by alum in a second portion of the same, is facilitated when the former are freed from lead by sulphuretted hydrogen, and the latter from sulphate of potassa and ammonia by alcohol, and then distilling off the alcohol. Organic bases, many bitter bodies, and other substances, will likewise be contained in those fluids, as well as in the alcoholic extract of the animal charcoal. *The concentrated residue of this alcoholic extract is diluted with water.* Should a body difficultly soluble in water be thereby thrown down, it should be collected on a filter. A small portion of the watery fluid is now mixed with a *solution of sugar of lead* by which a precipitate often results, because coloring matters and other bodies possessing the character of weak acids, afford, with lead, insoluble compounds. The fluid filtered from the precipitate resulting from sugar of lead is mixed with *subacetate of lead*, to observe whether a precipitate thereby ensues or not. If a precipitate results, it is separated by a filter from the fluid, and this is freed from lead by sulphuretted hydrogen, the sulphuretted hydrogen expelled, and the fluid evaporated to ascertain whether a residue remains, which is generally not the case, as sulphuret of lead frequently retains the bodies which were taken up by the charcoal from the watery solution. On this account the sulphuret of lead must be extracted with hot alcohol, and the hot liquid filtered from the sulphuret of lead in a hot-water funnel. *Both precipitates resulting from sugar of lead and subacetate of lead are boiled with alcohol* to ascertain whether they dissolve partially or entirely in alcohol. The solutions, if resulting, are treated with sulphuretted hydrogen, the sulphuret of lead heated to the boiling point with the spirit, and filtered hot. In the spirit with which the precipitate which resulted from subacetate of lead was heated, an organic base, or a mixture of several such bodies, may possibly be detected. The *portion of the lead precipitate remaining undissolved in boiling alcohol* is diffused through alcohol, decomposed by sulphuretted hydrogen, the fluid heated with the sulphuret of lead, and filtered hot. These different fluids are evaporated in a water-bath, and the residues preserved for further examination with reagents.

Having spoken of the treatment of the precipitates which are produced by sugar of lead and subacetate of lead in one portion of the watery decoction, and by alum and ammonia in another portion, and described the treatment of a part of the watery decoction with animal charcoal, we will now direct our attention to the liquid residues which have been obtained by the methods already related *from the watery decoction after treatment by the two salts of lead or alum and ammonia, and after the substances precipitated by these means have been separated from the lead by sulphuretted hydrogen, and the sulphate of potash and ammonia by alcohol.*

It was mentioned previously that sometimes *crystals* will separate from the *residues*, which by the evaporation of the water or the spirit are left behind, and that these crystals should be removed from the mother liquors from which they have separated.

When the crystals have been separated from the mother liquors, *their degree of solubility* must first be ascertained. That they are soluble in water is evident from their method of preparation, although they may be difficultly soluble in water. The presence of other substances in the watery decoction may considerably increase their solubility in water. If the same crystalline mass had had formed from the residues which were obtained from the watery decoction by the salts of lead as from the residues which remained after the treatment of the watery decoction by alum and ammonia, it results that this crystalline mass, which may be one body or a mixture of several substances, is quite as soluble in *alcohol* as in water, because, had it been insoluble in alcohol, it would have been left behind on separating the sulphates of potash and ammonia by anhydrous alcohol, with these sulphates as an insoluble body. It still remains to be ascertained whether the crystalline mass is quite or partially soluble in *ether*, as well as whether *acidulated water* dissolves more of it than pure water. When the degree of solubility has been learnt by these experiments, a method is afforded which had to be found to purify the still impure crystals by recrystallization before they are further investigated.

We first ascertain, with a very small quantity of the *crystals purified by recrystallization*, whether they can be partially or entirely sublimed or not, altered or unaltered. The experiment, which gives in most instances a negative result, can be performed between two small watch glasses fitted to one another.

To arrive at the nature of these crystals, we proceed further, in the following manner:—

We first ascertained whether an organic base, or a mixture of several organic bases, as an acetate or acetates, is contained in the crystalline mass. To detect these bodies, a portion of the separated crystals is employed, and this is divided into four equal parts.

The *first part* is dissolved in the smallest required quantity of water, and a few drops of hydrochloric acid are added to the solution, then *bichloride of platina*. If no precipitate ensues, a little anhydrous alcohol is added, and then if no precipitate results, a small quantity of ether. The resulting precipitate (if any) is separated by a filter from the fluid, and washed with a mixture of anhydrous alcohol with a little ether. The dried precipitate is tested, to ascertain whether it contains potassa or not, by heating it to redness, and extracting the platina residue with water, and testing for the potash therein, which must be present as chloride of potassium if the crystals contained potash. It is well to examine the portion of crystals employed, to learn their capacity for sublimation, to ascertain whether the residue generally remaining will burn completely, and, when it leaves an ash, whether potassa is present therein.

The second part of the solution is mixed with a solution of *bichloride of mercury*. By this means there are several bases precipitated—for example, *emetia*, &c.

The third part of the solution is mixed with a concentrated solution of *caustic soda* in very small quantity. If the crystals were the acetate of a base difficultly soluble in water, or if they contained a little of one or several such salts, the base would be precipitated from its concentrated solution by the alkali, after the neutralization of the acetic acid. In an excess of the alkali, the precipitated base is frequently more soluble than in pure water, therefore the alkali must only be added by drops. Instead of *caustic soda*, carbonate of soda can be employed.

The fourth part of the solution is heated after the addition of an alkali, and it is ascertained whether the vapor thereby evolved is alkaline. Such a vapor may result when a volatile base is present whose acetate is crystallizable, or when the crystals were, or contained a body analogous to, *asparagine*; in the latter case, ammonia is evolved under the given conditions.

According to researches of Sonnenschein, phosphor-molybdic acid is a good test to prove the presence of bases. It gives with all bases, almost without exception, precipitates as well with the oxygenated as the non-oxygenated ones; these are generally yellow, but sometimes colored brownish yellow. This compound is prepared by precipitating molybdate of ammonia with a phosphate of soda, suspending the well-washed precipitate in water, and heating it with carbonate of soda, until it is completely dissolved. This solution is evaporated to dryness, and then heated to redness, for the complete expulsion of the ammonia. If the molybdic acid is thereby partially reduced, the heated residue is moistened with nitric acid, and again heated to redness. The resulting dry saline mass is heated with water, nitric acid is added to produce a strong acid reaction, and then with so much water mixed, that ten parts of the solution contain one part of the dry saline mass. This golden yellow fluid, after filtration, must be preserved, excluded as much as possible from the influence of ammoniacal vapors.

If we have found by this examination whether basic bodies are present or not, it is necessary, in the case of bases being present, to ascertain whether one or more bases are at the same time present.

Many vegetable substances contain only a single base. The berries and leaves of coffee contain only *caffeina*, the berries of *coco* only *theobromina*, &c. But in *cinchona* bark, *quinia* and *cinchonia* are present; in the *strychnine*, *brucia* and *strychnia*, besides another base. The *papaveraceæ* contain at the same time three or more bases.

By the investigation of the degree of solubility, the opportunity has in many cases been given to learn whether we have to do with one or several bodies. To arrive at certainty on the point, the following method of examination is preferable to all others, which is founded on a discovery made

by Persoz, and first recommended by C. Oppermann as a method for separating several bases from one another:—

The concentrated aqueous solution of bases is mixed with *tartaric acid*, and then *bicarbonate of soda* is added. Oppermann has found that by this method of treatment quinine, morphine, and brucine are not; on the contrary, cinchonine, narcotine, and strychnine are, precipitated. Thus, in many cases when two bases are present, a separation of one from the other may be effected by this method. By mixing the fluid filtered from the precipitate which may have been produced by bicarbonate of soda with a little hydrochloric acid, and then adding bichloride of platina and alcohol, it can be readily determined whether a base still remains in the solution or not.

If we learn by this treatment that several bases are present, we must still ascertain whether the precipitated part and the non-precipitated part consists of one or more bases. The examination depends on the principle of *fractional precipitation, and the estimation of atomic weights which are undertaken with the individual portions of the precipitated bases*. For the performance of the examination thirty or forty grains of the substance to be tested is necessary. The part of the solution precipitable after mixture with tartaric acid by bicarbonate of soda is first separated from the unprecipitable part and collected on a filter, then dissolved in dilute hydrochloric acid, and half the quantity of the solution of bicarbonate of soda is added which was required to throw down the entire quantity of bases. This quantity should be previously ascertained with small measured quantities of the solution of the bases and bicarbonate of soda. It is evident that the hydrochloric acid solution of the bases must be quite neutral—that is, must contain no excess of acid.

The substance separated by the first half of the precipitant, and the precipitate produced by the second half of the same, are collected on filters and washed, then dissolved in dilute hydrochloric acid, and mixed with bichloride of platinum and alcohol. Both the platina precipitates are washed with alcohol mixed with ether, dried, and heated to redness.

From the quantity of platina remaining behind, it will be seen whether one or more bases are present. A closer examination with reagents whose behaviour to bases is known, may first be performed with good results when the separation of the different bases has been thus approximately attained.

If we have by these means learnt that the separated crystals are not an organic base, or a mixture of such bases, or rather their salts, with acetic acid, they must be therefore an indifferent organic body, or rarely a mixture of several substances of that kind. The presence or absence of nitrogen—that is, the presence or absence of a body perhaps analogous to asparagine—has been already decided by the experiment with the concentrated solution of caustic soda in the heat.

The preponderating majority of these indifferent vegetable substances

has been proved by careful investigation to belong to the class of copulated carbohydrates—as, for example, salicine, phloridzine, populine, arbutine, ononine, aesculine, &c. It is, therefore, our problem to ascertain whether the crystals in question belong or not to this class of bodies—that is, whether by acids (when these do not act in a too concentrated form at high temperatures) they are split into two products, one of which—a carbohydrate—is in the majority of cases sugar, or a similarly composed body. By the action of alkalies on these bodies, two products likewise result—one which is in exceptional instances sugar, but in the majority of cases a carbohydrate, with properties different to those of sugar. Frequently the salt of an acid results, and a product which is decomposed by acids into two products, one of which is sugar.

To ascertain whether a copulated carbohydrate of that kind is present, the crystals under examination are treated in the following manner:—

They are dissolved in the smallest possible quantity of water, and the solution is mixed with a small quantity of *strong hydrochloric acid*, the acid solution is introduced into a flask, and the air drawn out by a stream of carbonic acid gas. The flask is heated on a sand-bath until its contents boil. To intercept the volatile products of decomposition perhaps evolved, the flask is connected with a refrigeratory apparatus and a receiver. In many cases while heating, and in others after cooling, the fluid boiled for some time deposits a product of the decomposition sometimes in the form of distinct crystals, sometimes in the form of amorphous flocks, or in a state of powder. Occasionally a dense oily or resinous mass is deposited, which sometimes, after long standing, becomes crystalline. When an *insoluble* or *difficultly soluble* decomposition product is separated after the fluid has cooled, this is collected on a filter. It is advisable to cool the fluid down to 32° Fahr., to effect thereby a more complete separation. The filtered acid fluid is then mixed with freshly precipitated moist *carbonate of lead*, until, upon the addition of this salt, no more effervescence takes place. The solution containing the chloride of lead in solution, together with the undissolved chloride of lead is poured into a basin, heated on a water-bath, and in small portions *freshly prepared or still moist* white lead is added. A basic lead salt of very slight solubility results. As soon as by the addition of a fresh quantity of white lead no more change is remarked, the contents of the basin are placed on a filter. The filtered fluid is mixed with *phosphate of silver*, which is prepared by precipitating a solution of phosphate of soda of the Pharmacopœias with a solution of nitrate of silver, and which is preserved in a *moist state*, excluded from the light. As soon as the phosphate of silver and the dissolved chloride of lead come into contact with one another, they are decomposed into insoluble chloride of silver, and into insoluble phosphate of lead. The phosphate of silver is consequently added until the yellow color of the silver salt no longer disappears; the precipitate in the fluid thus assumes a yellowish color. The fluid is filtered from the precipitate, which is washed. The filtered fluid, together with the

small quantity of washings, is mixed with pure white lead into a paste, and gently heated for a short time. The white color of the milky fluid begins to pass into a reddish grey by the decomposition of the phosphate of silver, which is soluble in a small quantity in water. The fluid filtered from the insoluble contents is freed from a trace of lead by sulphuretted hydrogen, separated from sulphuret of lead by filtration and evaporated in a water-bath. If sugar has formed by the treatment with hydrochloric acid, it is obtained as a syrupy sweet mass, which crystallizes after standing some days, but requires occasionally some weeks.

When, by the treatment with hydrochloric acid in the heat, *no decomposition products insoluble or difficultly soluble* have separated, and in the receiver furnished with a refrigeratory apparatus, *no volatile products* are to be found, then either *no decomposition has ensued*, or *both the decomposition products are easily soluble in the water containing hydrochloric*. To discover whether soluble decomposition products have been produced, the acidulated fluid is mixed with dry carbonate of lead as long as effervescence results by the addition of a fresh quantity of the carbonate. The hydrochloric acid has a decomposing action on the carbonate of lead, and forms chloride of lead under the development of carbonic acid. The decomposition products of indifferent copulated compounds do not attack, in the cold, carbonate of lead in the majority of cases, because a strong organic acid seldom results from the decomposition of these bodies. Only in the heat do these bodies decompose carbonate of lead. On the contrary, they decompose more readily the freshly precipitated moist carbonate of lead, or that preserved in a pasty wet state after precipitation. The chloride of lead is filtered from the liquid, and thus much hydrochloric acid is separated. The fluid is now concentrated in a water-bath, whereby, especially after cooling, the greater part of the chloride of lead contained in the fluid separates. The separated chloride of lead is filtered off, dried, after it has been well pressed between bibulous paper frequently renewed, and now heated to learn whether it is mixed with an organic substance, which is generally not the case. Should an organic lead compound be admixed with chloride of lead, it is ascertained whether it can be extracted with alcohol from the chloride of lead, wherein the latter is insoluble. When the organic lead compound is not soluble in alcohol, the chloride of lead mixed with the organic lead compound must be decomposed under water by sulphuretted hydrogen, by which means the organic substance and hydrochloric acid are obtained in the fluid filtered from the sulphuret of lead. A small quantity of this fluid is mixed with *baryta water*, to ascertain whether, besides chloride of barium, which remains in solution, a baryta compound of the organic substance, insoluble in water, results. When this is the case, the solution containing chloride of barium is filtered from the baryta compound, which is washed with water, and the organic body which was combined with the baryta, that is, the pure decomposition product, is obtained by decomposing the baryta compound with dilute sul-

phuric acid. As chloride of barium is almost insoluble in quite anhydrous alcohol, and the majority of the baryta compounds of organic substances, on the contrary, dissolve with great difficulty in weak spirit, we can, when baryta water produces no precipitate in the hydrochloric acid fluid, add absolute alcohol, whereby a baryta compound of the decomposition product is often thrown down before the chloride of barium separates.

It is self-evident that the fluid containing hydrochloric acid, which is obtained by heating the aqueous solution of the crystals under examination with a little hydrochloric acid, may be mixed with baryta water, to observe whether a precipitate, that is, a compound of the decomposition product, insoluble in water, is thereby formed or not; in the latter case, the addition of a little anhydrous alcohol assists the precipitation. If a precipitate is not produced either by baryta water alone, or by baryta water and alcohol, a second portion of the fluid, containing hydrochloric acid, is taken and mixed with freshly precipitated *carbonate of silver*, which is converted into insoluble chloride of silver by the hydrochloric acid, under the evolution of carbonic acid. The chloride of silver is separated by filtration from the fluid, which is now free from hydrochloric acid. Two cases can hereby happen. Either there results, besides the chloride of silver, the silver compound of a decomposition product insoluble in water or not. If no insoluble compound of a decomposition product with silver, has separated with the chloride of silver, the filtered fluid contains silver or not. If it contains silver, the silver must be separated by sulphuretted hydrogen; then we have a watery solution of both decomposition products. If it does not contain silver, the filtrate is a pure solution of decomposition products. Of their further treatment we shall directly speak. When a decomposition product is precipitated, together with chloride of silver, as an insoluble silver compound, and filtered off, the filtered fluid is a solution of sugar, or a solution of a carbohydrate with the same composition as sugar. When the solution of both decomposition products is obtained in a condition free from hydrochloric acid, we must endeavor to effect a separation with *bichloride of tin*, or with *basic acetate of lead*. Many of the decomposition products appearing with sugar are precipitated by bichloride of tin, and most of these bodies are thrown down by basic acetate of lead. The tin and lead compounds obtained may be decomposed by sulphuretted hydrogen, after they have been diffused in water. The fluid filtered from these tin and lead compounds, after treatment with sulphuretted hydrogen, can be employed for obtaining the sugar.

If the research which has been made with both portions of the fluid under examination has lead to no result, a third portion of the fluid, containing hydrochloric acid, is taken and mixed with a solution of *sulphate of silver* as long as a turbidness arises from precipitated chloride of silver. The chloride of silver is removed by filtration, the fluid containing sulphuric acid is mixed with baryta water as long as sulphate of baryta separates, and by filtration a solution of both decomposition products is obtained free from acid.

Varieties.

Arnica Hair Wash.—When the hair is falling off and becoming thin from the too frequent use of castor, macassar oils, &c., or when premature baldness arises from illness, the arnica hair wash will be found of great service in arresting the mischief. It is thus prepared:—Take elder water, half a pint; sherry wine, half a pint; tincture of arnica half an ounce; alcoholic ammonia one drachm—if this last named ingredient is old, and has lost its strength, then two drachms instead of one may be employed. The whole of these are to be mixed in a lotion bottle, and applied to the head every night with a sponge. Wash the head with warm water twice a week. Soft brushes only must be used during the growth of the young hair.—*The Druggist.*

Blackberry Wine.—To make a wine equal in value to port, take ripe blackberries, press the juice from them, let it stand 36 hours to ferment (lightly covered,) and skim off whatever rises to the top; then, to every gallon of the juice add 1 quart of water and 3 lbs. of sugar, (brown will do;) let it stand in an open vessel for 24 hours; skim and strain it, then barrel it. Let it stand 8 or 9 months, when it should be racked off, and bottled, and corked close; age improves it.—*The Druggist.*

Insects in grain.—A French commission, appointed to examine into the means of destroying insects which prey upon grain that is stored up, have reported that a small quantity of chloroform or sulphuret of carbon put into the interior of a grain pit, and then hermetically sealed up, will destroy all the pests. About 75 grains of sulphuret of carbon are sufficient for about four bushels. Grain placed in a heap, and covered with a tarpaulin, may be effectually treated thus to destroy such insects.—*The Druggist.*

Crayons or Drawing Chalks.—The civilizing influence of art is constantly improving the taste of the people. Color, pattern, and design must now pervade all our manufactures, to keep pace with the improved judgment of purchasers as to true beauty. Nothing tends to advance art more than making drawing one of the common branches of education, and few materials will render drawing more popular than the colored chalks or crayons as made by Messrs. Joel, of Paris, which are prepared thus: Take three-quarters of a pound of blue clay, three-quarters of a pound of the coloring required, such as vermillion, chrome, Prussian blue, orpiment, &c., two ounces of turpentine, four ounces of spirits of wine, and six ounces of fine shellac. The clay must be well mixed with water, passed through a fine lawn sieve, and allowed to subside; the water is then poured off and

the clay dried. The shellac must be dissolved in the mixed turpentine and spirit with a little warmth. The dried clay and the coloring must be now well blended in a mortar, and then the shellac mixture added and well incorporated till the whole is a doughy mass: it is then to be rolled out into pencil form and dried with stove heat. To make the crayons of uniform substance, the paste may be placed in a cylinder, with a hole at one end and a piston at the other, (like a boy's pop-gun), the "wormy" pieces that pass through are then cut into proper lengths and dried.—*Sep-timus Piesse.*

A new Caustic for Toothache.—The following treatment is recommended by Dr. Calvy, of Toulon, for the neuralgia proceeding from carious teeth. The carious cavity is first to be cleaned out, and then a piece of cotton, steeped in a solution of six grains of acetate of morphia in an ounce of nitric acid, is to be applied to its interior. As soon as the caustic penetrates into the carious tooth, the pain ceases, and the patient is cured. After the application of the caustic, the cavity should be filled with cotton steeped in the sedative solution of opium, and afterwards permanently plugged.—*Br. Med. Journ. from Gaz. des. Hôpitaux, Jan. 10, 1861.*

Juice of Chelidonium Majus has been locally applied with the most satisfactory results in cases of greatly itching eczema, injuries from nettles, and other itching diseases of the skin, by Grand-Clement (*Bull. de Thérap. lvi.*, p. 326). Mixed with an equal quantity of glycerine, it can be preserved and used for the same purpose at times when the fresh plant cannot be obtained.—*London Pharm. Journ. July, 1860.*

Ferri Carbonas Effervescentes: a New Form of Chalybeate.—Dr. T. Skinner, in a communication to the Dublin Medical Press, recommends the following formula for preparing effervescent carbonate of iron:—

R. Acidi Tart., 3ij.
Sodæ Bicarbonatis, 3v.
Ferri Sulph., 3x.
Pulv. Sacchari, 3j. 3vj.
Acidi Citrici, 3ij.

1. Mix the sulphate of iron with the sugar and part of the tartaric acid.
2. Mix the citric acid with the remainder of the tartaric acid and the bi-carbonate of soda.
3. Add the mixtures, and thoroughly incorporate them by sifting.
4. The whole is now to be thrown into a metallic pan set in a water-bath; in a few minutes it will separate, when it should be rapidly stirred until granules are formed. If preferred, it may then be flavored with oil of lemon; hitherto, however, the preparation has been without it.

When the above is carefully prepared, it has all the appearance of the popular and well known granular effervescent citrate of magnesia, with the

addition of a slight yellowish green tint. Every drachm and a half contains ten grains of sulphate of iron, which, with a complement of bicarbonate of soda, is certain to produce, in a state of solution, four grains of nascent protocarbonate of iron.—*London Pharm. Journ. Aug.*, 1861.

New Test for Diabetes.—This test consists in the conversion of the saccharine element of diabetic urine into caramel by heat.

The following is the mode of applying it:—

Upon a clean slip of tinned iron place one or two drops of the suspected material, and hold it over a spirit lamp; the fluid will speedily evaporate, leaving, if the process be arrested at that point, scarcely a trace upon the metallic surface. Continue the application of heat; in a few moments after the desiccation is complete, a spot of an inch or so in diameter, over which the drops spread with the first ebullition, will gradually assume a rich reddish-brown color, with a brilliant lustre, as if coated with a film of Japan lacquer. A solution of sugar, not diabetic, exhibits almost exactly the same reaction.—*London Pharm. Journ. Aug.* 1861.

Manufacture of Pure Phosphoric Acid.—Dr. J. Neustadt publishes (Dingler's *Polytech. Journal*, Bd. clix, s. 442) an "improved method of making pure phosphoric acid on the large scale." The process involves the preparation of phosphate of soda from bone ash, the formation of phosphate of baryta from this, and the subsequent decomposition of the last by sulphuric acid. In the first place, one part of finely powdered bone ash is mixed with four parts of water and one part hydrochloric acid. After standing six hours, the clear liquid is poured off, and to it is added a boiling solution of sulphate of soda. The sulphate of lime is allowed to deposit, the liquor is poured off, and the precipitate washed and pressed. The liquor decanted, which contains acid phosphate of soda, chloride of sodium, and some sulphate of lime, is now boiled with carbonate of soda and rendered neutral, and then filtered from the precipitated carbonate of lime. We have now a neutral solution of phosphate of soda, and chloride of sodium, to which is added just enough of a hot solution of chloride of barium to precipitate the phosphoric acid in the form of phosphate of baryta. Twice the weight of the bone-ash operated on, the author says, is the quantity of chloride of barium required. After washing, the phosphate of baryta (prepared from one part of bone-ash) is mixed with one part of sulphuric acid diluted with three parts of water, and stirred occasionally for two or three days, until no sulphuric acid is found in the liquor, which is then strong and pure phosphoric acid.—*Chem. News, London.*

Editorial Department.

PHARMACEUTICAL EDUCATION.—In times like the present, when the regular routine of Society is threatened with convulsion, and the arrangements of to-day may be soon altered by the pressure of circumstances, it behoves the rising generation to avoid, as far as possible, the evil results by securing a business education, fitting them to meet the exigencies which may surround them on their entry into manhood. This education becomes an indestructible capital, ready at all times to aid the possessor. The able mechanic, the thorough book-keeper, the earnest physician, and the qualified pharmaceutist, are much more likely to find employment than the pretender or half educated. Especially is the truth of this in pharmacy illustrated every day by the difficulty of procuring well qualified clerks for *responsible* positions. So long as a clerk holds a subordinate position, there are many imperfections which may be submitted to whilst he is constantly associated with an abler hand; but where the whole guidance of a business devolves on a clerk, it is expected that he will be able not only to meet the ordinary demands on his knowledge, but that he will be capable of acting in all the emergencies arising at the counter. The pharmaceutical student cannot too earnestly attend to the details of the shop—fortunate, if he be placed with an employer the scope of whose business, and the arrangements of whose shop, are such as to afford a wide range of experience, and ample means of preparation. With a clear sense of the importance of knowledge derived from College instruction, we are quite sincere in the belief that it will not substitute the practical tuition of the Counter and Laboratory, which, indeed, it is intended to illustrate and extend rather than to replace. But the apothecary who has had his education solely at the counter, though generally well posted in the practical part of his profession, and, where his duties included the manufacturing of preparations, shows an aptitude towards mere routine, yet he is often greatly perplexed by chemical impediments in processes that are as Greek to him in the absence of book knowledge and study. When, however, he is able to combine the theoretical instruction of the College with the practical duties of the shop, the student is in the position best calculated to educate himself thoroughly; the difficulties which arise in practice are cleared up and explained or remedied where possible, new methods are suggested, and like a mariner with a compass, he is not afraid to strike out into the obscure or unknown where he has chemistry as his friend and guide.

The season for study is approaching, and unfavorable as are the times

for pecuniary outlay, young men will find it capital well invested to urge on their studies, and accomplish the task of graduation, without risking its postponement to a distant opportunity which to them may never offer. Many instances occur to us where great regret has been expressed that this important professional accomplishment had been neglected, when, in after business-life, the advantages of a diploma have been urged by its necessity as a certificate of qualification.

PROGRESS OF THE BRITISH PHARMACOPÆIA.—In the August number of the Pharmaceutical Journal, we find the following Report of Dr. Garrod, Secretary of the Pharmacopœia Committee, having the Revision of the Pharmacopœia in charge—by which it will be seen that, although nearly ready for the press, it will not be issued in October as was anticipated last winter. The interest felt by many pharmacists and physicians in the early completion of this work, induces us to copy the report in full. It exhibits an outline view of the manner in which the revision has proceeded.

The British Pharmacopœia.—At a meeting of the General Council of Medical Education and Registration, held on Tuesday, July 2, the following Report of the Secretary of the Pharmacopœia Committee was read :—

“ During the period which has elapsed since the meeting of the General Council of Medical Education and Registration in 1860, the three divisions of the Pharmacopœia Committee has persevered in their labors, and the manuscript of the British Pharmacopœia is approaching completion, and will very shortly be ready for press, as will be seen in the following report, which, with co-operation of Dr. Aquilla Smith, of the Dublin; and Dr. Charles Wilson, of the Edinburgh Committees, I am now enabled to lay before the Council :

“ In order that the exact state of forwardness of the work may be correctly understood by the Council, it will be well to give a short sketch of its construction.

“ It is divided into two parts, with an Appendix.

“ Part I. contains a list of the *Materia Medica*, in which all the substances employed as medicines are inserted, and appended to each is its origin, with its definition, principal characters, tests for purity, and an enumeration of its officinal preparations.

“ Part II. contains the various groups of Galenicals,—as extracts, infusions, tinctures, ointments, &c., with the methods of preparing each; likewise the processes for making the numerous chemicals described in the first part of the work.

“ The Appendix includes the substances employed, not as remedies, but only in their preparation; and likewise the various test solutions to be used in ascertaining the strength and purity of drugs.

“ One-third of the work has been allotted to each section of the Committee, and the portion framed by any one has been transmitted to the other two Committees, commented upon, and afterwards revised by the original Committee, and again recommended upon; all undecided points are then reserved until the final general meeting of the delegates of the Pharmacopœia Committee.

“ Part I. is necessarily the least complete, as a knowledge of all the preparations in Part II. is required before its final adjustment.

"Dr. Wilson thus reports from the Edinburgh Section:—'The list of the *Materia Medica* allotted to its share is nearly, if not altogether, complete, and will soon be transmitted to the other Committees,' and Dr. Aquilla Smith states, that 'Descriptions of the Drugs derived from the vegetable kingdom have been drawn up by the members of the Committee, but they cannot be completed until the Galenical Preparations are definitely settled and printed.' Professor Harvey, the Botanical Referee, is engaged in preparing his report, which will shortly be completed. Of the Chemical Preparations in the list of the *Materia Medica*, the formulas of the numerous preparations of iron have been printed in No. 8 of the Proceedings of the Committee, and circulated amongst the members of the three Branch Committees. The preparations of mercury were sent to Dr. Wilson, the secretary of the Edinburgh Committee, in April, 1861, and all the remaining chemical substances have been reported upon and approved of by the Committee.

"The London Committee has constructed its third of the list of the *Materia Medica*, and likewise nearly all the processes for the chemicals attached to that portion, and is now having a fair copy prepared for transmission to the other Committees.

"Part II. The three sections of the Committee have framed all the groups of Galenical Preparations; the whole have been commented upon, and most of them revised, and either transmitted or about to be immediately forwarded for final comments.

"It has been agreed by the three sections, that a General Meeting of Delegates from each shall be held in Edinburgh the first week in next September, in order to adjust any differences which may remain, and to make arrangements for the printing and publication of the work, which it may be seasonably hoped will be accomplished by the end of the present year.

"The Council will be enabled to appreciate the labor of compiling the *British Pharmacopœia*, and the cause of its somewhat tardy appearance, when it is stated that every preparation contained in the work has been made, often repeatedly, and each process practically examined; and it is the hope of the Committee that the *British Pharmacopœia* will be found worthy of the sanction and approval of the General Council.

"A. B. GARROD, M. D., F. R. S., *Secretary*.

"84, Harley street, Cavendish square, July 1, 1861

OUR THANKS are due to Dr. Hartmann, of Cleveland, for the translations on the "Adulterations of Musk," and "some Species of *Helleborus*," at pages 426 and 427.

Subscribers to this Journal, who are in arrears, will oblige the Treasurer of the Publishing Committee by giving their earliest attention to the liquidation of their dues. Though not constituted as a financial agency, this Journal, until lately, has more than supported its expenses, but owing to the lopping off of a large number of its subscribers at the South, and the depressed condition of monetary affairs, it is likely to become a burthen on the College, unless its just dues are paid in by the subscribers.

Transactions of the Medical Society of the State of New York for the year 1861. Albany: Charles Van Benthuysen, Printer, 1861; pp. 408, 8vo.

We are indebted to Dr. Edward R. Squibb for the above Report, but it was received too late to notice several papers contained in it which have some bearing on the subjects discussed by this Journal, and we may take another opportunity of recurring to them.

OBITUARY.

JOSEPH LAIDLEY.—It will be remembered by those familiar with the graduating class of the Philadelphia College of Pharmacy of 1850—a class which, though small in number, was rather remarkable for the ability of its members—that Joseph Laidley, was among them, and by no means the least brilliant. Entering upon his apprenticeship as a Pharmaceutist with the late celebrated firm of Smith & Hodgson he continued with them and their successors, Bullock & Crenshaw, until 1850. Soon after this period he obtained a clerkship with Messrs Adie & Gray of Richmond, Virginia, at a liberal salary, and, we are informed, introduced a new era into their establishment as regarded its manufacturing department. Several years since Mr. Laidley commenced business in Richmond in partnership with Mr. Edward Robinson of that city, from which firm he subsequently retired, and last year opened an establishment on his own account in the same city. About six weeks before his death, we are informed that he advertised to prepare detonating powder for military purposes, which offer appears to have brought him to the notice of the authorities, as at the time of his decease he was in the employ of the Confederate Government at their cartridge factory.

Mr. Laidley is said to be of Irish parentage. Several years since he married a lady of Nelson County, Virginia, who survives him. Our last interview with him was last spring, some time before the secession of Virginia, and he had evidently made up his mind to cast his fortunes with the South in the event of a disruption of the then existing relations. As a pharmaceutist, the subject of this notice was able, and capable of original investigation, but more marked for the boldness with which he advocated his views than by accuracy in their demonstration. He formerly was a valued contributor to this Journal, the pages of which bear testimony to his industry, in the 25th, 26th, and 27th volumes. At one period Mr. Laidley was an active member, and one of the Vice-Presidents, of the American Pharmaceutical Association, of which he became a member at its organization in 1852, at Philadelphia, but for the last five years he has ceased to take any public interest in the advancement of Pharmacy. Owing all that rendered him efficient as a man, as well as a chemist and pharmaceutist, to his northern education and connection, it was hardly to be expected that he would have voluntarily aimed a blow at his country, and in the very act

be visited by so terrible a fate, as is detailed in the following extract from a Richmond paper.

"Horrible Catastrophe.—Mr. Joseph Laidley, the well known chemist, came to an untimely, sudden and horrible death about 20 minutes to one o'clock yesterday, by the explosion of a quantity of detonating powder, which he and an assistant named Robert Clayton, of Manchester, were preparing for the use of the Confederate Army, in a building erected especially for their use on an eminence in rear of the State armory, and equidistant between that and Thomas' Factory, where cartridges are now being fabricated for the Government. At the hour above named an explosion was heard resembling the discharge of a six-pounder. On repairing to the place a scene of rare horror met the gaze. The wooden out-building, and the interior one in which the powder was manufactured, were found blown down, and many of the timbers wrenched, twisted and broken in a manner to show the almost inconceivable power of the powder. Mr. Laidley was found lying on his back, one of the most horrible objects of mutilated humanity which it is possible to conceive. Within a few yards of the body was found a portion of the poor man's brains, looking as if they had been torn by a superhuman agency from the skull and splashed upon the floor. The entire head, except the lower jaw, had been blown off, and nothing remained to mark the features of a man, except a pair of whiskers and a portion of the neck. The right arm was torn off below the elbow, and from the bloody stump hung the fragments of nerves, veins and sinews which were left behind. The hand was afterwards found about two hundred yards from the place of explosion, in the yard of the State Armory, a portion of the face was likewise found (it is said) three hundred yards distant, near the banks of the river. The search for the remainder proved unavailing.

As soon as the facts became known a large number of persons collected, among whom were several of the Masonic fraternity, of which he was a member. These gathered up the remains and conveyed them to a house in the rear of Thomas' factory, where a metallic coffin soon after arrived, and the body was prepared for burial.

His assistant, Mr. Clayton, was found in a reclining posture against a post, doubled up as if he had suffered a fearful contortion. He was perfectly insensible, and so remained up to a late hour last night, but it was not ascertained to what extent he was internally injured. Drs. Wellford and Conway were summoned to the scene immediately after the accident, but their efforts proved unavailing to afford relief.

Among the rumors connected with this melancholy affair, was one to the effect that deceased had been seen going towards the laboratory smoking a cigar. Several persons declared that they saw him going thither smoking, a short time before the explosion was heard. It is said that he was not in the habit of smoking. It is certain, however, that a cigar was found in the pocket of his coat, which he had pulled off and hung on the wall of the interior room, where it remained until after the explosion.

Our latest information is to the effect that the fulminating powder was not sufficiently wet. Its manufacture is not dangerous when proper care is taken."